Agri-Food and Biosciences Institute
Agriculture, Food and Environmental Science Division
Fisheries and Aquatic Ecosystems Branch

Cruise Report: CO 1010
Vessel: RV *Corystes*
Date: 1st – 24th March 2010
Area: Irish Sea (north); ICES VIIa
Survey Type: Groundfish and Scallop Survey

Personnel:

R Briggs	PSO	SIC 1 – 3 March & 21 – 24 March
P McCorriston	TSO	SIC 6 – 19 March
J Peel	ASO	1 -24 March
I McCausland	ASO	1 -24 March
G Brady	ASO	1 -12 March
D Garland	SO	8 – 12 March & 21 – 24 March
P Irvine	SO	8 – 12 March
G Marshall	ASO	15 – 24 March
R Gilmore	SO	15 – 19 March
F George	SO	15 – 19 March
B Donnelly	SO	15 – 24 March

Circulation	✓
DCEO & CEO	✓
Ship Managers	✓
Fisheries Division	✓
ANIFPO	✓
NIFPO	✓

Comments

Signed Head of Branch

Objectives:

i. Conduct a dredge survey of the scallop Pecten maximus and bycatch off Northern Ireland.

ii. To obtain information on spatial patterns of abundance of different size-and-age classes of demersal fish in the Irish Sea.

iii. To obtain abundance indicies of cod, whiting, haddock and herring for use at ICES Working Groups.

iv. To quantify external parasite loads in whiting and cod by area.

v. To collect tissue samples for genetics studies on mature cod, hake and haddock.

vi. To collect ovary tissue samples from mature cod, haddock and plaice for fecundity studies.

vii. To collect additional biological information on species as required under DCF.

Phase 1: Scallops and bycatch

Methods:

The gear used during the first phase of the cruise was a 2 metre beam with four 2-foot dredges and was deployed from the starboard trawl winch on 24mm warp. A fine mesh (<10mm) liner was attached to one dredge to retain small benthic fauna. Catches were sorted and the associated fauna identified and counted. Scallops were weighed and measured (shell length and height). Meat yield was determined from abductor muscle and gonad weight. Shells were aged by examination of growth bands on the flat shell and these were retained for age verification by microscopic examination of hinge ligament scars after the cruise.

Cruise Narrative:

Sunday 28 February

Scientific personnel boarded RV Corystes during the evening of Sunday 15 February

Monday 1 March

RV Corystes sailed at 07.00 and proceeded to the scallop grounds north of Belfast Lough. The dredges were deployed and 4 tows were completed in **Area lV,** of which only one had a significant scallop catch (Tow 4). This was followed by 5 tows in **Area ll**. Damage to the netting of two dredges caused work to stop for the day while repairs were carried out. The night was spent steaming slowly down to Area I off the southern tip of the Ards Peninsula.

Tuesday 2 March

Dredging commenced at 07.30 in **Area I** where 5 tows were completed in calm weather conditions. This was followed by 6 additional tows in **Area II** (15-20) but catches were very poor with 3 tows at the same station (Tows 17 – 19) still failing to provide a scallop catch. The night was spent moving towards **Area V** for the final days fishing. Problems with the winch brake during the day hampered progress and arrangements were made to dock earlier than planned for repairs once the scallop phase of the survey was completed.

Wednesday 3 March

Work started at 07.21 with a tow north of Belfast Lough in **Area V,** followed by a further 7 tows in this area (Tows 21-28). Catches were good with around 100 scallops being landed per tow. This marked the end of the scallop phase of the cruise and the dredges were made fast. The ScanMar sensors were then attached to the rockhopper trawl and calibrated in readiness for the groundfish phase of the survey. A trial or “shakedown” tow was completed with the codend open, in order to familiarize staff with procedures and to ensure that the equipment was working. With this task complete RV Corystes set course for Belfast, docking at 18.00 for a cruise break in order that essential repairs to the starboard trawl winch could be carried out.

Work Completed and Preliminary Results:
During Phase 1 (scallop survey) 28 scallop stations were dredged (Fig 1 and Table 1) yielding 1,165 scallops, of which 757 were shucked and subjected to biological analysis. Scallop age determination, based upon shell ring counts will be verified after the cruise from microscopic examination of hinge ligament scars. Provisional scallop catch at age is presented in Table 2 and Figure 2.

Benthic fauna associated with scallops was identified and are presented in Table 3. Echinoderms remain the most predominant group with the common starfish *Asterias rubens* which is an important predator of juvenile scallops the most abundant species. The seven arm starfish *Luidia ciliaris* and predator of echinoderms was noted at most stations throughout the survey. The data from the cruise will be used to monitor the affects of fishing and environmental change.

Phase 2: Groundfish Survey

Methods:
A commercial Rockhopper trawl fitted with a 20mm liner in the cod-end was towed over three nautical miles at stations in the Irish Sea as shown in Figure 3 and one nautical mile for St George’s Channel stations. Gear and towing procedures were those employed on all previous AFBI groundfish surveys and as agreed by the ICES WG for the co-ordination of bottom trawl surveys (WGIBTS). Trawl configuration was monitored continuously through ScanMar technology. A stratified survey with fixed station positions was employed throughout and was divided into strata defined by depth and substratum, as indicated in Figure 3. The species composition of the catch at each station was determined and length frequency distributions recorded for each species. All cod, most hake along with sub-samples of haddock and whiting were taken for biological analysis (length, weight, sex and maturity). Otoliths were removed from gadoid samples for future age determination and the level of infestation of whiting and cod by external parasites was noted from each station

Cruise Narrative:

Saturday 06th March
Scientific staff boarded at 1000 hours for sailing at 1100 hours, and proceeded to station **35** for trawling, followed by stations **86** and **83**. This completed stratum 1. With the forecast giving calm weather for a few days the decision was made to head to the east side of the Irish Sea. The vessel made way overnight to station 63 for fishing in the morning.

Sunday 07th March
Stations **63, 256, 64** and **257** were fished in calm conditions, however, there was a strong tide at station 63, and more warp was needed to keep the net on the seabed.

Monday 08th March
Stations **258, 259, 250** and **242** were fished in calm conditions.

Tuesday 09th March
Stations **342, 249, 247** and **246** were fished in good conditions. This completed stratum 6

Wednesday 10th March

Stations **245, 243, 76, 77, 102** and **51** were fished in good conditions. Station 245 was fished at slack water. Large catches of herring were caught at stations 245, 243 and 76. The haul at station 243 was recovered after 20 due to the large amount of fish in the net. It was decided to re-do this station at the end of the survey if time permitted.

Thursday 11th March

Stations **105, 51, 96** and **216** were fished in good conditions. This completed Stratum 7. Station 105 was fished when tide started to ease and 51 was fished at slack water.

Friday 12th March

Stations **48, 99** and **101** were fished in good conditions. It was difficult to get door spread correct at station 48, fishing head to wind. Station 99 was fished at slack water. After completing station 101, the vessel steamed back to Belfast for a well earned 48 hour mid-cruise break and to change scientific personnel. Staff disembarked at 2100

Sunday 14th March

Scientific staff boarded at 2200. The vessel sailed at 2300hrs and proceeded to station 97 for trawling the next morning.

Monday 15th March

Stations **97, 46, 81, 17** and **100** were fished in good conditions. Station 100 was fished at slack water.

Tuesday 16th March

Stations **70, 88, 71** and **208** were fished. Station 71 was fished at slack water. Strong winds were forecasted and the night was spent sheltering off Skerries

Wednesday 17th March

Stations **93, 94, 56, 90** and **75** were fished. This completed stratum 3. Tides were strong during the day especially at station 90, 93 and 94. This resulted in more wire being needed to keep net on seabed. Strong to gale force southerly gales were forecasted during the night and the vessel once again spent the night sheltering off Skerries

Thursday 18th March

Stations **92, 79** and **73** were fished. This completed stratum 2. Station 92 was trawled first light at slack water but poor conditions, later, sea conditions became too rough for deploying the net and forecast was giving a time of southerly gales. After dodging for while, station 79 was fished at slack water and station 73 trawled late afternoon when winds eased. During the night the vessel proceeded to station 50.

Friday 19th March

Stations **50, 103, 108** and **107** were fished. Stations 50 and 108 were fished at slack water while station 107 was fished during strong tide and additional warp was deployed to keep the net on the seabed. This completed stratum 4. Then proceeded to Dublin and docked at 2000hrs for the second cruise break during which another change of scientific personnel took place.

Sunday 21st March

RV Corystes sailed at 07.00 and set course for station **118** in Stratum 9 which was fished in good weather conditions. Despite deteriorating weather conditions stations **106, 109, 110** and **120** were completed. The night was spent dodging in strong southerly winds in readiness to commence work at station 119 the next day if the weather improved.

Monday 22nd March
Work started at station **119** in breezy conditions. This was followed by stations **112, 111, 114** and **113.** With Stratum 9 stations completed the night was spent slowly steaming east to fish Cardigan Bay stations in Stratum 10 the next day.

Tuesday 23rd March
Stations **115, 116** and **117** were fished in fine weather conditions. A safety drill was organized by the Chief Officer in the afternoon. Course was then set for the “redo” station 243 SE of the Isle of Man.

Wednesday 24th March
The gear was shot on station **243** at 07.00 but problems with the headline transducer transmission led to the tow being aborted and re-shot with a freshly charged transducer. The catch was predominantly herring with mixed gadoids throughout. It was processed according to usual protocols. With all objectives of the survey completed a course was set for Belfast. During this steam the Fishing Master gave a presentation on ship security arrangements arising from 9-11. RV Corystes docked at 18.00.

Work Completed and Preliminary Results:
During the survey 61 valid hauls were completed (Fig. 3 and Table 4) plus 1 haul which had to be repeated (Station 243). The width of seabed swept by the trawl doors ranged from around 30m in shallow water (30m sounding) to around 45m in deeper water (80m sounding), with variations due to tidal flow. The average headline height was 2.5 – 3.0 m. These trawl parameters were consistent with previous surveys. Cod and whiting taken for biological analysis were screened for external parasites. Trawl data and length frequencies were archived using the groundfish survey database. Around 70 taxa were recorded in the catches. Biological parameters were collected for a range of species as summarized in the text table below. Table 5 shows the species composition of catches (kg) by station and survey stratum and Table 6 is the catch in kg per 3 nautical miles (approx 1 hour) towed, for fish below and at or above the minimum landing size of 27 cm (whiting) and 30 cm (haddock).

Biological Samples Collected during CO1010

Species	No. of Otoliths and maturity	No. of tissue samples	No. of ovary tissue samples	Maturity only
Cod	350	350	22	
Haddock	713		100	
Whiting	1312			
Hake	46	46		
Plaice	300		100	
Brill	20			
Turbot	5			
Ling	4			
Pollack	5			
Conger	0			
John Dory	0			
Sea Bass	1			
Spurdog	5			
Thornback Ray				54
Spotted Ray				191
Cuckoo Ray				14
Blonde Ray				22
TOTAL	2761	396	222	281

Acknowledgements:

The Master and personnel of the *RV Corystes* are thanked for their co-operation throughout the cruise and for ensuring efficient and consistent trawling operations. The scientific personnel are thanked for the very thorough work completed.

Signed:

Richard Briggs and Peter McCorriston
Scientists in Charge
24 March 2010

Alan Hughes (seen in draft)
Master

Table 1: Mid-point point, depth and scallop catch per nautical mile (CO10-10)

TOW	Area	Latitude		Longitude		Depth m	catch nm^{-1}
1	IV	54	41.81	5	35.50	19.0	0.0
2	IV	54	42.26	5	38.13	15.0	0.0
3	IV	54	43.79	5	34.49	41.0	1.5
4	IV	54	42.07	5	34.29	34.0	55.0
5	II	54	37.02	5	28.04	41.5	4.5
6	II	54	35.37	5	27.22	47.0	66.9
7	II	54	36.27	5	26.25	44.0	5.9
8	II	54	36.30	5	26.78	38.5	11.3
9	II	54	36.57	5	28.64	32.5	3.1
10	I	54	20.15	5	24.73	37.0	21.7
11	I	54	21.81	5	23.34	41.0	19.8
12	I	54	21.08	5	26.01	29.0	17.2
13	I	54	22.37	5	23.77	34.0	19.5
14	I	54	23.28	5	22.67	45.0	1.5
15	II	54	27.85	5	22.71	44.5	2.1
16	II	54	27.86	5	23.49	39.5	20.2
19	II	54	28.95	5	22.42	47.5	5.7
20	II	54	38.17	5	22.96	70.0	0.6
21	V	54	48.53	5	40.60	39.5	66.5
22	V	54	48.18	5	40.81	34.5	66.4
23	V	54	47.78	5	40.68	35.5	50.6
24	V	54	47.72	5	40.31	45.0	63.4
25	V	54	48.03	5	40.68	40.0	80.1
26	V	54	47.96	5	58.16	61.5	78.3
27	V	54	48.30	5	40.64	41.5	92.0
28	V	54	46.51	5	40.27	32.0	82.5

Table 2: Number of scallops caught at age per nautical mile.

AREA I

AGE	10	11	12	13	14	mean
1	0.0	0.0	0.0	0.0	0.0	**0.0**
2	0.7	0.0	0.0	0.0	0.0	**0.1**
3	0.0	0.6	1.1	0.0	0.5	**0.5**
4	2.9	2.4	2.9	2.8	0.5	**2.3**
5	2.9	4.8	2.3	2.2	0.5	**2.5**
6	6.5	4.8	5.7	5.6	0.0	**4.5**
7	5.8	3.0	3.4	7.8	0.0	**4.0**
8	1.4	3.0	1.7	1.1	0.0	**1.5**
9	1.4	0.0	0.0	0.0	0.0	**0.3**
10	0.0	1.2	0.0	0.0	0.0	**0.2**
10+	0.0	0.0	0.0	0.0	0.0	**0.0**
Tot.	**21.7**	**19.8**	**17.2**	**19.5**	**1.5**	**16.0**

AREA II

AGE	5	6	7	8	9	15	16	19	20	mean
1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
3.0	0.0	0.0	0.0	0.8	0.0	0.0	1.6	0.5	0.0	**0.3**
4.0	1.5	2.4	0.0	0.0	0.0	0.7	4.0	1.0	0.0	**1.1**
5.0	0.0	5.5	1.3	0.8	0.8	0.0	5.6	0.0	0.0	**1.6**
6.0	0.0	8.7	0.7	0.8	0.0	0.0	0.8	1.0	0.0	**1.3**
7.0	1.5	19.7	0.7	3.8	0.8	0.0	0.8	1.0	0.0	**3.1**
8.0	0.0	11.8	0.7	0.8	1.5	0.0	0.8	0.0	0.6	**1.8**
9.0	0.0	10.2	0.0	0.8	0.0	0.7	2.4	0.0	0.0	**1.6**
10.0	0.0	3.9	0.0	1.5	0.0	0.0	0.8	0.0	0.0	**0.7**
10+	0.8	4.7	2.6	2.3	0.0	0.7	3.2	2.1	0.0	**1.8**
Tot.	**4.5**	**66.9**	**5.9**	**11.3**	**3.1**	**2.1**	**20.2**	**5.7**	**0.6**	**13.4**

AREA IV

AGE	1	2	3	4	mean
1	0.0	0.0	0.0	0.0	**0.0**
2	0.0	0.0	0.0	0.0	**0.0**
3	0.0	0.0	0.0	1.3	**0.3**
4	0.0	0.0	0.0	16.3	**4.1**
5	0.0	0.0	0.8	22.5	**5.8**
6	0.0	0.0	0.0	7.5	**1.9**
7	0.0	0.0	0.0	1.3	**0.3**
8	0.0	0.0	0.0	6.3	**1.6**
9	0.0	0.0	0.0	0.0	**0.0**
10	0.0	0.0	0.0	0.0	**0.0**
10+	0.0	0.0	0.8	0.0	**0.2**
Tot.	**0.0**	**0.0**	**1.5**	**55.0**	**14.1**

AREA V

AGE	21	22	23	24	25	26	27	28	mean
1	0	0	0	0	0	0	0	0	**0.0**
2	0	0	0	0	0	0	1	0	**0.1**
3	1	0	0	0	1	1	1	1	**0.5**
4	5	3	11	5	10	5	16	22	**9.7**
5	9	9	6	10	7	12	20	31	**13.0**
6	15	20	10	20	15	28	13	13	**16.6**
7	13	15	10	14	21	16	22	10	**15.0**
8	12	12	7	7	14	10	9	3	**9.3**
9	8	7	5	6	5	4	6	2	**5.3**
10	2	1	1	1	6	2	4	1	**2.1**
10+	1	1	0	1	2	1	0	1	**0.9**
Total	**66.5**	**66.4**	**50.6**	**63.4**	**80.1**	**78.3**	**92.0**	**82.5**	**72.5**

Table 3: Bycatch taxa per nautical mile – CO10-10 (SCALLOPS)

AREA	Area I					Area II									Area IV				Area V							
Species/Tow	**10**	**11**	**12**	**13**	**14**	**5**	**6**	**7**	**8**	**9**	**15**	**16**	**19***	**20**	**1**	**2**	**3**	**4**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Pecten maximus	23.9	26.4	23.5	26.9	2.1	4.5	66.9	5.9	11.3	3.1	2.1	20.2	5.7	0.6			1.5	55.0	66.5	66.4	50.6	63.4	80.1	78.3	92.0	82.5
Asterias rubens	18.1	9.3	15.2	6.7	0.7	0.8	4.7	5.9	17.3	5.4	4.3	1.6	4.2		2.5	9.2	10.0	46.3	22.4	14.5	37.2	9.8	31.6	95.8	19.0	46.5
Ophiothrix fragilis	1.4	27.1	58.3	11.2			26.8					63.7	2.6					5.0	10.0	0.7	1.2		7.4			
Liocarcinus depurator	5.8	9.3	1.5	8.2							13.6	13.7	1.0								1.2					0.9
Crossaster papposus						1.5	2.4	0.7	3.0	0.8		0.8				1.5		8.8	5.9	2.0	4.1	2.6	5.1	6.6	4.0	5.3
Eupagurus spp	8.7	12.4	0.8	6.0		0.8	1.6		4.5		1.4	2.4	1.0	0.6				5.0	4.1		1.7	0.7			1.0	
Echinus esculentus				1.5			14.2	3.9	6.8								0.8	3.8		0.7		2.6	0.7	0.6	2.0	
Venus spp			0.8				35.4							0.6												
Cancer pagurus	3.6	4.7	7.6					0.7				2.4	0.5					5.0	2.9	0.7	0.6		2.9			
Callionymus lyra	2.9	1.6	1.5	3.0				0.7			1.4	5.6	2.1				0.8		0.6				0.7			
Luidia ciliaris											2.1	4.8	2.6				0.8		2.9	0.7	0.6	1.3		2.4		
Anseropoda placenta									0.8				0.5		1.7			2.5	4.7	0.7	1.7	0.7	0.7		4.0	
Alcyonium digitatum											2.9	2.4	0.5			4.6									4.0	
Macropodia spp	1.4	7.0	0.8				0.8					0.8							0.6							
Psammechinus spp				0.7			5.5	1.3	2.3									1.3								
Neptunea antiqua							4.7											2.5								
Necora puber																2.3		1.3	0.6	0.7	0.6		1.5			
Ophiocomina nigra			6.1																							
Lanice spp		3.1		2.2																						
Agonus cataphractus							1.6				0.7	0.8						1.3								0.9
Limanda limanda	0.7	3.9																								
Zeugopterus punctatus		0.8																		0.7	0.6	0.7	0.7		1.0	
Henricia spp				1.5					0.8								1.5		0.6							
Raja montagui	0.7							0.7			0.7										0.6		0.7	0.6		
Adamsia				2.2															0.6				0.7			
Raja naevus													0.5				0.8					0.7	0.7	0.6		
Hyas araneus									0.8											0.7		0.7			1.0	
Inachus spp							0.8											1.3				0.7				
Venus big rough spp							2.4																			
Astropecten irregularis							1.6				0.7															
Dichelopandalus bonneri	0.7	1.6																								
Merlangius merlangus								0.7				0.8									0.6					
Pleuronectes platessa											1.4		0.5													
Modiolus modiolus																1.5										
Crangon crangon			1.5																							
Melanogrammus aeglefinus							0.8				0.7															
Nudibranchs												0.8								0.7						
Trisopterus esmarki		0.8						0.7																		
Scyliorhinus canicula	0.7							0.7																		
Aquipecten opercularis														0.6			0.8									
Gonoplax rhomboides																		1.3								
Nereis spp																		1.3								
Entelurus aequoreus																									1.0	
Calliostoma zizyphinum							0.8																			
Ebalia spp							0.8																			
Glyptocephalus cynoglossus							0.8																			
Ascidella aspersa		0.8																								
Buglossidium luteum		0.8																								
Eurynome spp		0.8																								
Trisopterus minutus																	0.8									
Mermaids purse																0.8										
Arctica iclandica			0.8																							
Golfingia spp			0.8																							
Ammodytes spp				0.7																						
Eutrigla gurnardus	0.7																									
Liparis montagui								0.7																		
Marthasterias																				0.7						
Solaster endeca																				0.7						
Munida rugosa																						0.7				
Nephrops norvegicus													0.5													
Scophthalmus rhombus													0.5													

*Tows 17&18 aborted

Table 4 Details of trawls during Groundfish phase of LF1010 (Time in G.M.T.)

				Shooting Position				Hauling Position				Shot	Haul	Mean	Distance	Door	Wind
Date	Station	Haul	Time shot	Latitude		Longitude		Latitude		Longitude		Depth (m)	Depth (m)	Depth (m)	towed (nm)	Spread	Speed
06/03/2010	35	1	11h.21	54	42.96	5	42.07	54	43.74	5	37.06	15	27	21	3	26.6	16
06/03/2010	86	2	13h.50	54	34.37	5	25.51	54	37.28	5	27.16	47	36	41.5	3.1	35.7	10
06/03/2010	83	3	16h.33	54	23.03	5	18.21	54	20.11	5	16.81	94	84	89	3	38.2	5
07/03/2010	63	4	06h.47	54	37.39	4	10.74	54	36.33	4	15.41	67	56	61.5	2.9	43.4	19
07/03/2010	256	5	09h.21	54	37.22	4	0.52	54	37.9	3	55.47	41	34	37.5	3	35.6	14
07/03/2010	64	6	12h.41	54	34.57	3	46.1	54	37.42	3	44.53	23	27	25	3	31.5	12
07/03/2010	257	7	16h.03	54	26.42	3	46.03	54	23.49	3	44.98	34	37	35.5	3	31.3	7
08/03/2010	258	8	06h.41	54	22.65	3	57.46	54	20.03	3	55.08	46	44	45	3	33	10
08/03/2010	259	9	10h.01	54	14.85	3	41.74	54	17.78	3	43.06	38	39	38.5	3	31.3	5
08/03/2010	250	10	13h.36	54	3.64	3	37.48	54	6.37	3	39.39	33	36	34.5	3	30.6	3
08/03/2010	242	11	16h.15	54	6.77	4	2.41	54	3.8	4	1.93	38	44	41	3	32.5	2
09/03/2010	342	12	06h.45	53	57.53	3	50.54	53	54.58	3	50.16	41	43	42	3	33.9	1
09/03/2010	249	13	09h.25	53	48.26	3	45.6	53	46.29	3	41.73	41	39	40	3	33.7	9
09/03/2010	247	14	12h.34	53	36.23	3	38.38	53	38.82	3	35.87	37	35	36	3	31.1	8
09/03/2010	246	15	15h.00	53	29.29	3	42.58	53	28.52	3	47.43	36	39	37.5	3	32	6
10/03/2010	245	16	06h.23	53	29.65	4	10.34	53	30.82	4	15	45	50	47.5	3	35.7	8
10/03/2010	76	18	12h.07	53	59.25	4	29.8	54	0.41	4	25.13	45	47	46	3	34.9	8
10/03/2010	77	19	14h.52	53	50.55	4	41.47	53	48.24	4	44.54	86	91	88.5	3.1	40.5	5
10/03/2010	102	20	16h.32	53	46.93	4	41.05	53	44.19	4	38.87	65	68	66.5	3.1	38.7	3
11/03/2010	105	21	06h.45	53	43.25	5	1.28	53	41.18	5	5.27	81	79	80	3.1	40.4	10
11/03/2010	51	22	09h.21	53	51.07	4	58.29	53	53.97	4	59.55	85	64	74.5	3	40.2	8
11/03/2010	96	23	14h.07	53	49.6	5	8.28	53	52.37	5	6.14	70	68	69	3.1	38.4	6
11/03/2010	216	24	16h.11	53	56.26	5	12.27	53	53.7	5	14.96	79	87	83	3.1	40.5	10
12/03/2010	48	25	06h.43	53	58.16	4	57.61	54	0.74	4	59.88	63	59	61	2.9	42	27
12/03/2010	99	26	09h.37	54	7.46	5	1.41	54	4.91	5	4.16	82	85	83.5	3	43	15
12/03/2010	101	27	13h.12	54	7.95	5	19.46	54	4.97	5	18.64	86	130	108	3	43.2	16
15/3/2010	97	28	06h.40	54	17.96	4	54.21	54	20.84	4	55.64	76	90	83	2.9	39.9	17
15/3/2010	46	29	09h.37	54	10.64	4	58.63	54	13.22	4	56.03	88	88	88	3	42.1	10
15/3/2010	81	30	13h.06	54	15.3	5	23.16	54	12.35	5	24.12	51	54	52.5	3	35.1	10
15/3/2010	17	31	14h.54	54	8.27	5	30.26	54	5.91	5	33.44	57	57	57	3	36.4	15
15/3/2010	100	32	16h.44	54	8.49	5	40.85	54	11.48	5	41.05	31	27	29	3	29.7	12
16/3/2010	70	33	06h.37	54	2	5	45.07	53	58.98	5	45.26	38	52	45	3.1	33.4	10
16/3/2010	88	34	09h.29	53	59.83	5	41.21	53	56.85	5	42.01	59	72	65.5	3.1	37.3	10
16/3/2010	71	35	12h.13	53	54.21	5	52.55	53	53.03	5	57.25	48	43	45.5	3.1	36.1	20
16/3/2010	208	36	15h.13	53	46.12	5	46.52	53	49.12	5	46.52	67	58	62.5	3.1	38.7	15
17/3/2010	93	37	06h.38	53	32.24	5	50.18	53	29.33	5	49.12	61	64	62.5	3	41.1	15
17/3/2010	94	38	09h.42	53	25.21	5	47.66	53	22.46	5	45.62	88	85	86.5	3	42.3	20
17/3/2010	56	39	12h.39	53	30.26	5	43.02	53	30.67	5	38.03	76	91	83.5	3	42.9	20
17/3/2010	90	40	14h.32	53	36	5	41.08	53	39	5	41.51	90	87	88.5	3	40.2	23
17/3/2010	75	41	16h.22	53	39.47	5	49.73	53	42.35	5	51.21	62	56	59	3	36.6	23
18/3/2010	92	42	06h.45	53	34.84	5	54.41	53	37.52	5	56.63	45	41	43	3	37.8	24
18/3/2010	79	43	12h.44	53	41.55	5	58.89	53	44.37	6	0.59	40	37	38.5	3	36	32
18/3/2010	73	44	15h.44	53	47.83	6	2.06	53	50.63	6	3.84	34	33	33.5	3	32.8	24
19/3/2010	50	45	06h.36	53	43.61	5	22.01	53	46.38	5	20.09	86	80	83	3	41.6	10
19/3/2010	103	46	08h.59	53	36.05	5	23.77	53	33	5	25.46	88	92	90	3.2	43.9	14
19/3/2010	108	47	12h.43	53	12.91	5	13.56	53	11.91	5	13.71	116	124	120	1	44.5	10
19/3/2010	107	48	14h.40	53	14.72	5	33.13	53	15.71	5	33.05	95	99	97	1	42.8	5
21/3/2010	118	49	08h.47	53	14.37	6	0.55	53	13.41	6	0.05	34	35	34.5	1	35.1	18
21/3/2010	106	50	10h.47	53	12.65	5	51.69	53	11.7	5	51.6	47	42	44.5	1	38.8	15
21/3/2010	109	51	13h.46	52	59.15	5	19.14	52	58.17	5	19.49	94	94	94	1	42.4	18
21/3/2010	110	52	15h.43	52	52.88	5	39.51	52	53.82	5	39.04	72	69	70.5	1	47.1	14
21/3/2010	120	53	17h.05	52	58.62	5	46.22	52	57.61	5	45.96	69	61	65	1	42.3	22
22/3/2010	119	54	07h.11	52	36.85	6	6.27	52	37.84	6	5.99	31	30	30.5	1	40	24
22/3/2010	112	55	09h.01	52	34.26	6	2.24	52	33.26	6	2.5	36	39	37.5	1	40.7	14
22/3/2010	111	56	10h.58	52	43.28	5	48.87	52	42.24	5	49.27	76	74	75	1	44.4	12
22/3/2010	114	57	12h.44	52	36.07	5	46.58	52	35.88	5	44.74	73	75	74	1.1	42.4	15
22/3/2010	113	58	14h.57	52	22.4	5	52.21	52	21.4	5	52.39	87	90	88.5	1	45	10
23/3/2010	115	59	07h.05	52	19.33	4	56.47	52	20.22	4	55.74	60	60	60	1	40.5	16
23/3/2010	116	60	10h.07	52	18.42	4	16.15	52	17.79	4	17.4	27	28	27.5	1	31.3	20
23/3/2010	117	61	13h.11	52	43.22	4	29.41	52	42.86	4	30.95	53	56	54.5	1	39.7	10
24/3/2010	243	62	07h.31	53	48.95	4	10.22	53	46.9	4	6.53	61	55	58	3	38.3	12

Table 5

Species composition of catches (kg) by station and survey stratum in groundfish phase of CO-10-10 (0.0 ≤ 0.05 kg)

Type			**GADOIDS**					**PELAGIC**		**FLATFISH**				**ELASMONBRANCHS**		**INVERTEBRATES**		
Species			**COD**	**HAD**	**HKE**	**WHG**	**OTHER GADOIDS**	**HER**	**OTHER PELAGIC**	**DAB**	**PLE**	**OTHER FLATS**	**OTHER TELEOSTS**	**SKATES+ RAYS**	**SHARKS+ DOGFISH**	**NEP**	**CEPHA-LOPODS**	**OTHER INVERTS**
Stratum	**Station**	**Haul**																
1	35	1	0.0	0.1		26.9	0.1	303.1	4.2	0.6	1.8	0.2	0.4			0.2		3.1
1	83	3	0.7	9.7		65.6	11.1	3.0	2.7	0.1	0.4	0.4	1.1		2.1	2.8	0.2	4.8
1	86	2	12.6	8.8		83.1	0.4	1.2	0.3	0.5	0.6	0.5	1.3		9.0		0.0	3.7
2	70	33	3.9	9.9		21.0	0.2	371.4	120.1	63.5	43.9	2.1	5.7		1.2	0.0	0.0	0.5
2	71	35		0.2		23.6	0.1	753.6	233.2	40.3	120.0	5.8	0.9			0.0	0.2	0.1
2	73	44	1.7	0.1		8.0		89.9	96.3	13.3	55.8	4.4	0.4			0.0	0.1	0.0
2	79	43	3.8	0.3		23.6	0.2	596.3	20.3	29.5	76.1	7.4	2.4		0.8		0.0	0.1
2	81	30	3.3	4.0	0.2	47.4	3.8	163.5	20.9	12.7	2.9	0.3	2.9		0.1	0.4	0.2	0.4
2	92	42	3.8	32.0		163.0	6.0	465.5	0.1	16.1	189.1	2.2	11.5		0.5	0.1	0.5	0.2
2	100	32	4.8	0.8		3.6	0.0	1.5	38.6	14.4	56.2	7.8	0.7		2.8	0.0	0.0	0.3
3	17	31	8.3	14.8	0.1	98.6	1.0	512.0	7.7	24.4	3.3	0.2	7.6				0.2	0.1
3	56	39	27.6	24.7		29.4	10.1	3.4		0.3	4.5	2.8	1.4	7.8	99.2	0.6		0.9
3	75	41	20.2	104.3		118.7	15.8	27.9	0.4	4.1	19.5	0.4	9.7	3.6		2.2	0.6	2.3
3	88	34	3.2	11.1	0.2	41.7	8.5	142.8	14.8	28.5	9.8	0.4	3.6			0.0	0.6	0.2
3	90	40	9.5	3.5	1.3	34.8	6.9	4.5	0.9	0.2	0.5	0.2	1.7		32.8	1.2	0.0	6.7
3	93	37	10.7	174.8		155.9	17.3	54.6	0.6	3.2	22.2	7.0	14.1		21.1	0.4	0.8	0.5
3	94	38		12.4		38.6	0.5	61.6		1.6	13.5	1.2	1.6	3.6	129.5			1.3
3	101	27	1.0	3.7	1.8	46.6	27.5	1.3	0.1	0.4	1.2	1.0	4.3	0.5	1.2	28.1	0.3	29.2
3	208	36	7.7	53.5	0.4	48.4	21.2	171.5	0.1	5.6	9.0	0.3	11.0			0.4	1.0	0.5
4	46	29	16.1	6.5	0.3	175.6	114.6	0.5	0.1	0.1	1.8	1.2	13.0		2.7	36.9	0.3	37.0
4	48	25	3.7	78.9		104.1	13.0	153.5	2.1	16.0	7.2	10.6	13.3		27.3	0.8	0.6	2.9
4	50	45		26.9	0.9	78.2	7.3	2.1	0.0	0.6	2.1	2.0	35.0		34.1	15.0	0.1	15.2
4	51	22	17.8	93.4	0.5	114.9	17.8	346.0	0.6	4.7	14.5	37.2	189.4	3.9	328.5	3.1	0.1	10.8
4	96	23	10.4	78.9	0.3	53.0	32.9	83.7	0.7	12.3	4.4	4.7	5.0	0.8	66.7	0.1	0.6	0.1
4	97	28	12.7	64.0		168.9	69.8	1.3	0.2	0.5	4.0	6.0	39.1	8.1	3.0	23.7	0.4	23.7
4	99	26	8.9	51.6		251.3	153.6	67.2	0.4	0.8	2.2	6.0	24.9	1.2	3.6	26.9	1.8	27.0
4	103	46	0.0	8.6		38.5	5.7	1.6		0.1	3.8	1.0	81.1	13.8	487.7		0.0	2.8
4	216	24	3.7	5.0		28.6	13.9	5.9	0.2	0.3	1.0	0.6	3.9		4.1	24.1	0.8	24.2
5	63	4	5.1	0.7		174.1	7.9	15.1	2.2	0.2	10.0	5.1	6.4	2.8	7.3			1.0
6	64	6				9.5	0.6	49.6	213.1	8.6	34.5	2.1	0.1	16.4	10.7			1.0
6	242	11	1.3	0.0		71.9	0.0	16.7	24.9	26.0	126.8	6.0	2.2	0.2	7.0			2.4
6	246	15	1.5			250.9		233.8	35.3	163.8	76.3	3.4	1.6	1.8	11.4		0.0	0.4
6	247	14	0.1			70.0	0.7	31.9	48.4	27.9	49.9	7.2	19.7	2.8	10.5		0.0	2.5
6	249	13				129.6	3.3	83.0	82.3	33.7	43.4	10.5	0.9	15.5	4.6			0.9
6	250	10	0.5			58.9	10.4	157.8	133.9	16.9	22.7	1.9	0.4	4.4	2.5			0.6
6	256	5	3.9			10.1	2.3	128.9	62.6	8.9	73.3	3.6	2.0	5.9	12.6			0.6
6	257	7				17.4	2.2	52.2	375.0	8.3	14.5	3.2	0.1	6.2	7.9	0.7		1.0
6	258	8	2.7	0.0		56.1	14.9	113.7	19.5	39.2	132.1	22.3	1.8	13.6	8.1	3.0		4.1
6	259	9	4.0	0.0		66.0	3.5	1184.3	382.4	6.5	12.8	4.3	0.0	3.7	2.2			0.2
6	342	12	3.2			127.0	0.1	3.4		97.2	83.0	13.7	1.8	6.1	8.5		0.0	0.5
7	76	18	4.0	0.9		40.6	0.6	1481.8	77.8	0.1	0.8	0.7	22.0	0.8	67.4			2.8
7	77	19	9.1	57.3	2.6	48.7	16.9	69.4	0.1	0.6	25.6	12.4	14.4	4.6	218.8		0.0	15.2
7	102	20	0.2	20.9		39.9	8.0	31.7	0.5	0.3	24.7	7.7	13.7	2.3	69.3		0.1	2.5
7	105	21	1.9	15.8		15.0	5.6	38.5	0.1	0.1	12.0	6.6	260.9	1.5	70.3		0.0	0.5
7	243	17																
7	243	62	8.0			94.2	72.8	1623.7	26.2	3.2	32.6	26.8	20.8		89.5		1.0	1.2
7	245	16	10.7			73.4	12.6	1462.8	0.1	10.2	23.2	167.2	18.1		18.1		0.7	2.7
9	106	50	0.1	9.2		0.4	0.1	20.6	0.3	1.3	2.6		0.1		2.9			3.1
9	107	48		0.1		0.3	0.1	1.8	0.3	0.1	1.4		1.0	3.9	17.6			1.1
9	108	47	2.7	0.1		3.3	5.6	1.7	0.3	0.0	0.3	0.1	10.7	4.0	83.9		0.0	0.8
9	109	51	0.4			1.1	0.4	1.0	0.1	0.1		0.3	0.1	10.9	40.3		0.0	0.7
9	110	52	2.3	0.2		0.9	0.0	0.4	0.2	0.3	1.7	0.7	0.3	7.2	5.2		0.2	1.5
9	111	56	8.9			2.4	1.8	0.4	0.7	0.2			2.4	59.2	32.9			0.5
9	112	55	0.2	0.3		1.1	1.2	0.8	0.3	1.5	0.3	0.5	0.2	2.7	4.2		0.4	1.7
9	113	58	2.2	12.7	1.1	3.6	2.0	5.8	0.3	0.1	0.2	0.4	0.5	1.1	27.3		0.7	2.4
9	114	57	1.6	0.4	6.3	1.3	0.8	4.1	0.4	0.1	0.3	0.3	2.4	5.0	17.1		0.1	0.8
9	118	49		0.0		3.2	0.0	226.6	4.9	0.5	2.3		0.2	0.1				0.3
9	119	54	3.5	10.5		11.6	7.4	1.4		2.1	0.3		0.1	0.7	1.3		0.2	1.5
9	120	53	0.0	0.1		1.0	0.0	0.3	2.1	0.2	2.3		0.1	9.9	13.1			0.5
10	115	59	0.1	7.2		67.8	3.3	0.8	8.2	1.0	0.4	0.5	2.7		21.2		0.1	0.2
10	116	60				2.7		0.2	3.8	5.3	0.4	0.4	1.2	0.3	13.0			0.0
10	117	61	0.3	1.0		61.5	0.4	10.9	0.7	5.3	8.0	2.1	2.5	0.1	56.7		0.2	0.7

Table 6 Catches in kg per 3 nautical miles (approx 1 hour) towed, for fish below and at or above the minimum landing size of 27 cm (whiting) and 30 cm (haddock) during groundfish phase of cruise CO-10-10

			WHITING		HADDOCK	
STRATUM	STATION	HAUL	below MLS	above MLS	below MLS	above MLS
1	35	1	26.9	0.0	0.1	0.0
1	83	3	61.9	3.7	6.6	3.0
1	86	2	52.9	27.5	7.5	1.0
2	70	33	19.9	0.4	9.6	0.0
2	71	35	21.5	1.3	0.2	0.0
2	73	44	7.9	0.1	0.1	0.0
2	79	43	23.3	0.3	0.3	0.0
2	81	30	45.4	2.0	4.0	0.0
2	92	42	160.5	2.4	31.7	0.3
2	100	32	3.6	0.0	0.8	0.0
3	17	31	95.0	3.6	14.5	0.3
3	56	39	25.1	4.3	15.8	8.9
3	75	41	113.7	5.0	94.5	9.8
3	88	34	39.0	1.4	10.4	0.3
3	90	40	34.5	0.3	1.5	2.0
3	93	37	151.2	4.6	166.8	8.0
3	94	38	36.3	2.2	12.2	0.3
3	101	27	45.1	1.5	3.4	0.3
3	208	36	45.5	1.3	45.8	6.0
4	46	29	172.0	3.5	1.7	4.8
4	48	25	90.4	17.2	54.2	27.5
4	50	45	75.7	2.5	7.5	19.4
4	51	22	111.3	3.6	82.2	11.1
4	96	23	45.3	6.1	43.5	32.9
4	97	28	145.3	29.4	13.4	52.8
4	99	26	190.0	61.3	37.2	14.5
4	103	46	33.2	2.9	6.7	1.3
4	216	24	23.4	4.3	0.7	4.2
5	63	4	178.5	1.6	0.8	0.0
6	64	6	9.4	0.2	0.0	0.0
6	242	11	69.7	2.2	0.0	0.0
6	246	15	236.2	14.6	0.0	0.0
6	247	14	68.2	1.8	0.0	0.0
6	249	13	117.8	11.8	0.0	0.0
6	250	10	53.4	5.5	0.0	0.0
6	256	5	10.1	0.0	0.0	0.0
6	257	7	16.2	1.2	0.0	0.0
6	258	8	52.2	3.9	0.0	0.0
6	259	9	61.9	4.0	0.0	0.0
6	342	12	124.2	2.9	0.0	0.0
7	76	18	24.9	15.7	0.2	0.7
7	77	19	35.3	11.9	47.3	8.1
7	102	20	36.5	2.1	14.9	5.3
7	105	21	14.5	0.0	5.6	9.7
7	243	17	0.0	0.0	0.0	0.0
7	243	62	81.7	12.4	0.0	0.0
7	245	16	53.0	20.4	0.0	0.0
9	106	50	1.3	0.0	27.6	0.0
9	107	48	0.9	0.0	0.2	0.0
9	108	47	7.4	2.4	0.3	0.0
9	109	51	3.3	0.0	0.0	0.0
9	110	52	2.7	0.0	0.5	0.0
9	111	56	7.2	0.0	0.0	0.0
9	112	55	3.2	0.0	0.8	0.0
9	113	58	8.2	2.7	34.2	3.8
9	114	57	2.6	1.1	1.1	0.0
9	118	49	9.5	0.0	0.1	0.0
9	119	54	34.8	0.0	31.5	0.0
9	120	53	1.9	0.9	0.3	0.0
10	115	59	182.9	20.4	21.5	0.0
10	116	60	3.9	4.1	0.0	0.0
10	117	61	183.7	0.9	3.1	0.0
Mean:Strata (2-4)			70.2	6.5	26.3	8.2

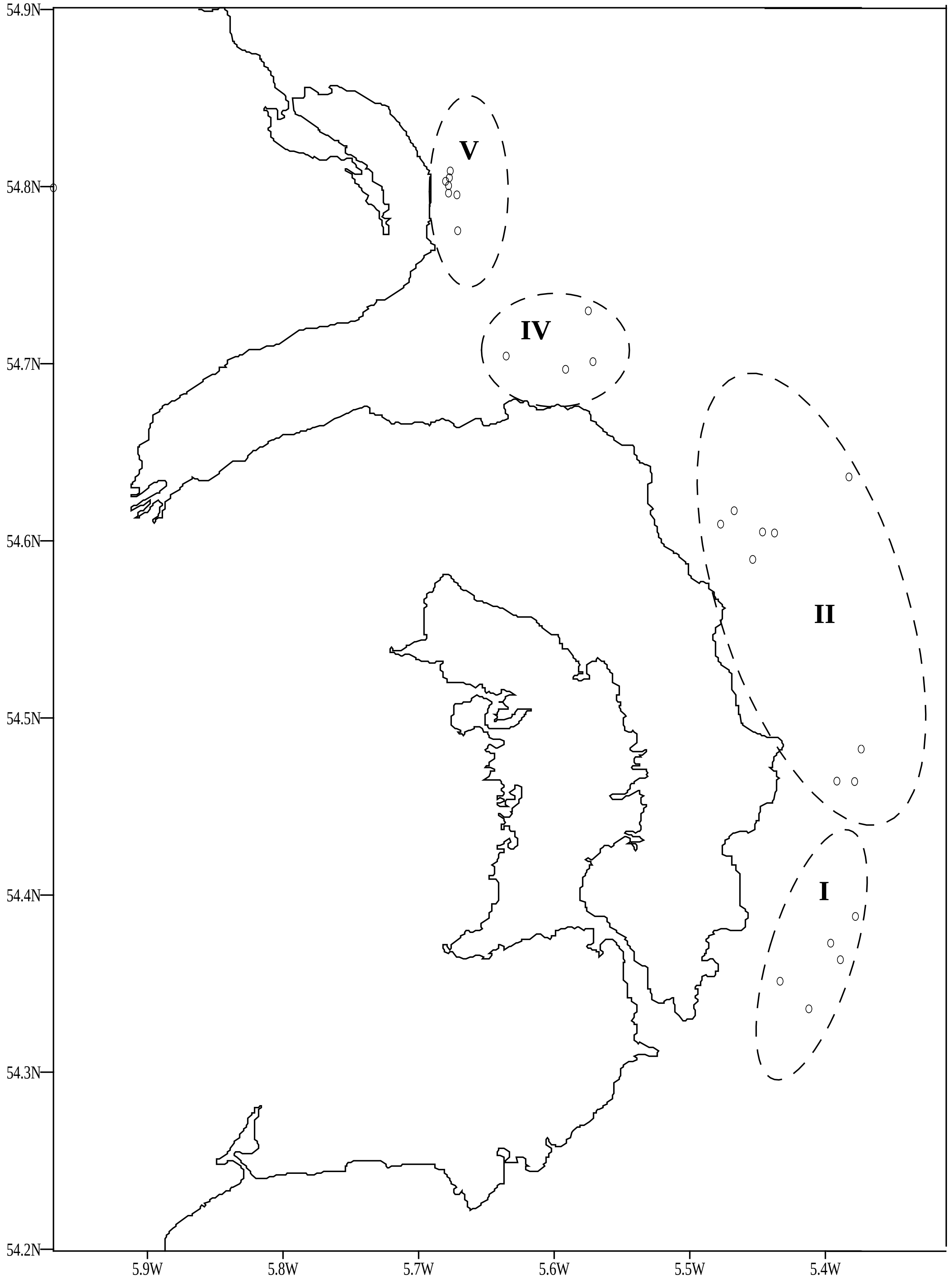
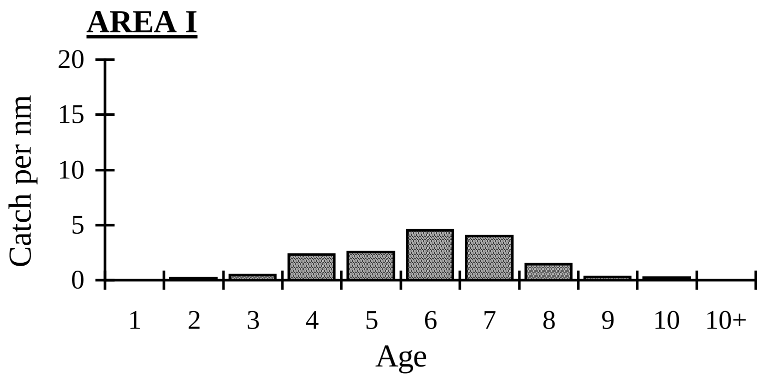
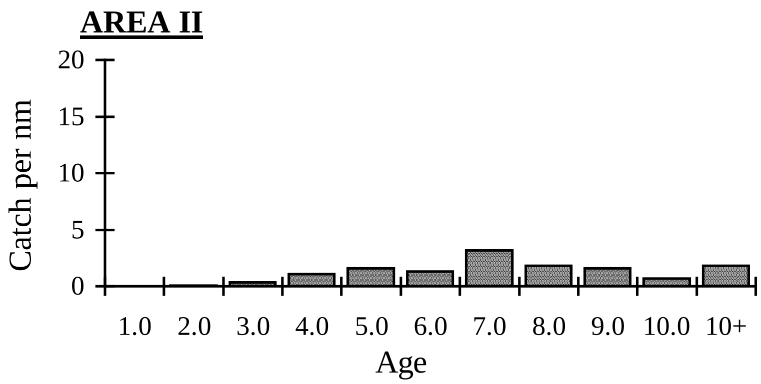
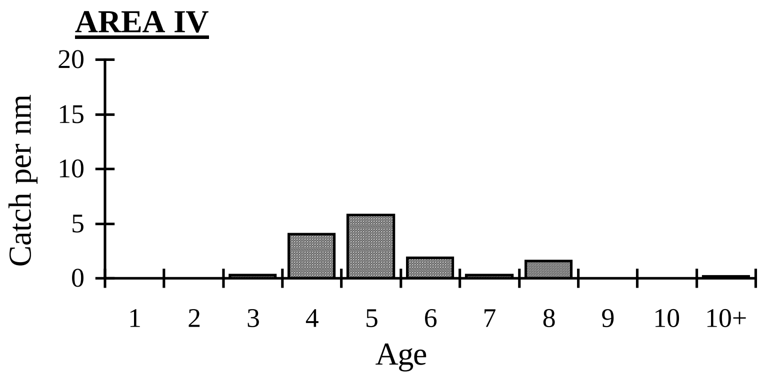


Figure 1: Phase 1 - scallop survey stations







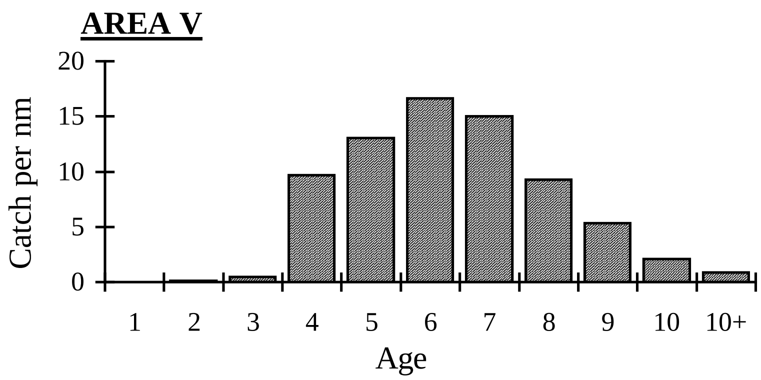
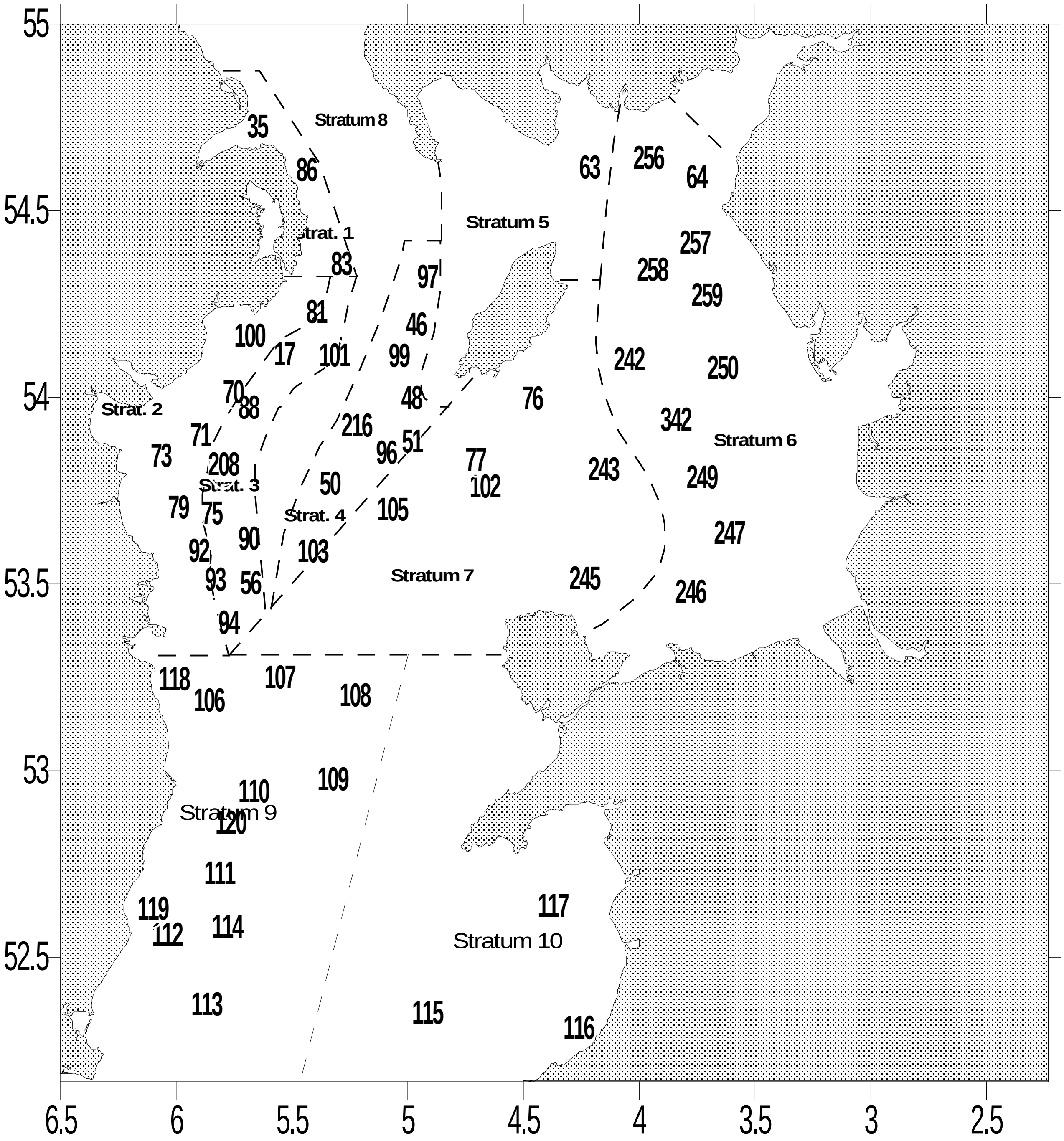


Figure 2: Mean scallop catch at age per nautical mile by Area



Key to strata:
1. Irish Coast (N), <100m, Mixed sediments
2. Irish Coast, < 50m, sand and finer sediments
3. Irish Coast, 50 - 100m, Muddy sediments
4. W and SW Isle of Man, 50 - 100m, mud and muddy sand
5. N Isle of Man, <50m, gravel sediments
6. Eastern Irish Sea, <50m, sand and finer sediments
7. S. Isle of Man, <100m, gravel sediments
8. Deep western channel and North Channel >100m
9. St George's Channel west; sandy/mixed sediments; <100m
10. St George's Channel east; sandy/mixed sediments; <100m

Figure 3: Phase 2 -Groundfish survey stations

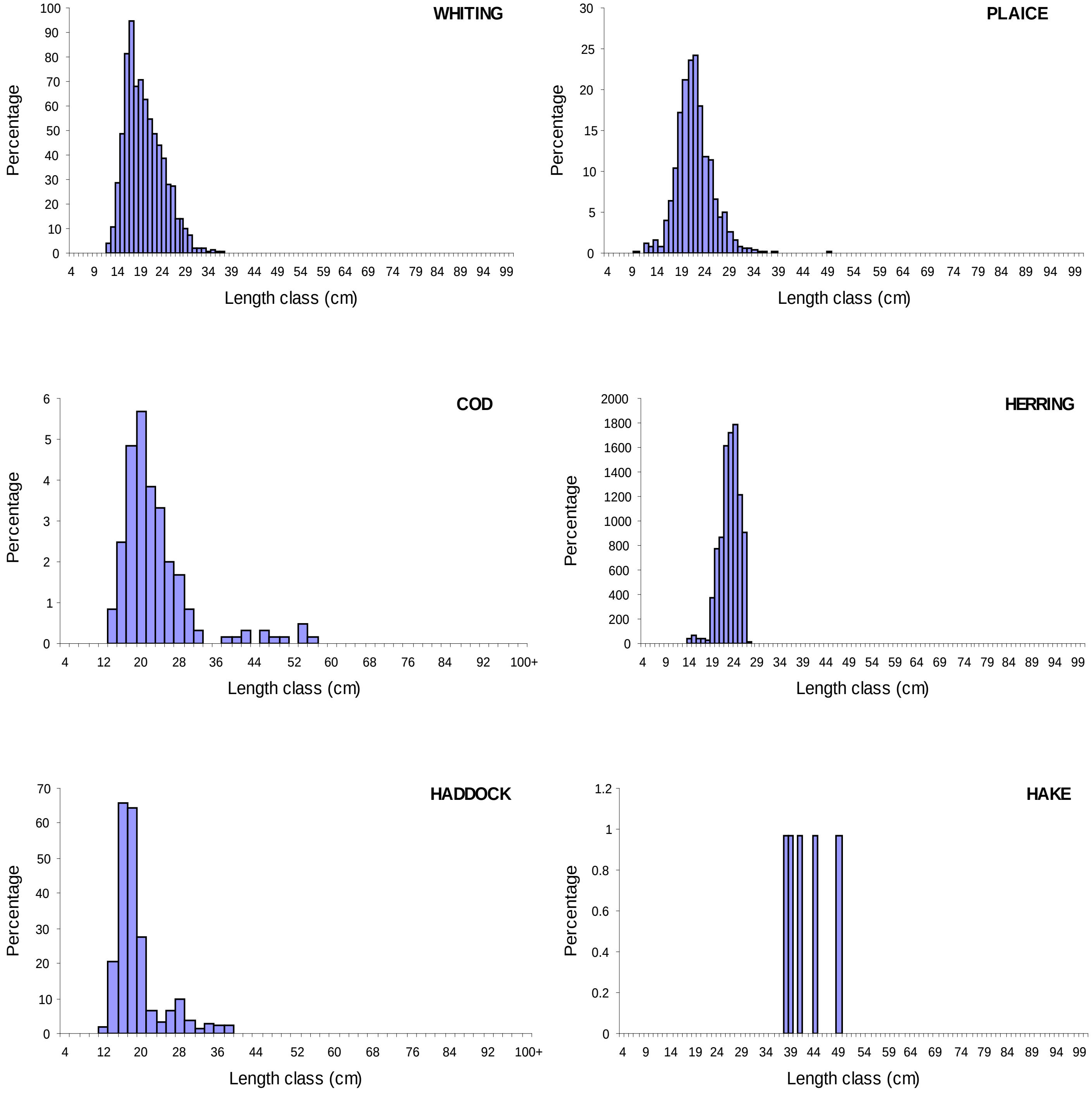


Figure 4: Average percentage length compositions of whiting, cod, haddock, plaice, herring and hake during groundfish phase of CO-10-10 based on strata 1, 2, 3, 4, 6 and 7.