

**AGRI-FOOD and BIOSCIENCES INSTITUTE (NI)**  
**Agriculture Food and Environmental Science Division**  
**(Fisheries and Aquatic Systems Branch)**

**Cruise Report:** CO 2106 (Part I) / CO 2306 (Part II)

**Vessel:** RV *Corystes*

**Date:** 22<sup>nd</sup> May – 9<sup>th</sup> June 2006

**Area:** Irish Sea (north); ICES div. VIIa

**Survey Type:** Gulf VII, MIK net, Biological Oceanography & Mooring Service

**Personnel:**

S Beggs (SIC)	22 May – 9 June
P McCorrison	22 May – 9 June
J Peel	22 May – 9 June
B Stewart	22 May – 28 May
R Gilmore	22 May – 26 May
C Smyth	22 May – 26 May
E O’Callaghan	1 June – 9 June
G Foster	1 June – 9 June
J Hill	22 May – 28 May
G Marshall	1 June – 9 June

**Objectives:**

- i. To investigate the distribution and abundance of juvenile gadoids in the Irish Sea (ICES Area VIIa North).
- ii. To collect and preserve juvenile fish for future otolith analysis.
- iii. To maintain and service the Irish Sea insitu monitoring programme at open sea station 38A.
- iv. To obtain water, beam trawl and box core samples as part of a PhD study.

**Cruise Narrative:**

**CO 2106 Part I:**

Sunday 21<sup>st</sup> May

The R.V. *Corystes* departed from Belfast docks at 21:00 and headed directly for Dundrum Bay. Due to the prevailing weather conditions sampling was postponed.

### Monday 22<sup>nd</sup> May

Sampling began shortly after lunch with a further 8 stations completed in gradually improving conditions. MIK net sampling began shortly after 21:00 and a total of 7 stations were completed in fair conditions.

### Tuesday 23<sup>rd</sup> May

Gulf VII sampling continued in fair/choppy conditions with a further 13 stations completed. The MIK net sampling resumed at approximately 20:00. An unknown problem with the transducer occurred on the second haul but despite the efforts of the crew no fault could be detected, the haul was repeated and the equipment worked successfully. A further 9 stations were completed.

### Wednesday 24<sup>th</sup> May

Sampling continued in unsettled conditions. MIK net sampling stopped at 04:00 to facilitate the change over of scientist and crew shift patterns for the mooring service.

### Thursday 25<sup>th</sup> May

The vessel arrived at the offshore mooring site at 06:00. The weather was dry and bright with light westerly wind. Work for the day commenced at 07:00 with the deployment of the rosette water sampler. After breakfast the mooring service operations began when the complete instrument mooring was recovered to ship deck at 08:30. The mooring components were inspected for corrosion and replaced where necessary. The thermistors and Sea-bird CTD were removed from the mooring and data downloaded. The McLane automated water sampler was cleansed and following removal of samples the instrument was rebuilt and reprogrammed for deployment. The biological water sampler had failed to function and a subsequent inspection had traced the problem to a faulty pump. The sampler was set aside for return to Newforge.

The mooring components, water sampler, thermistors and CTD were then reassembled and the instrument mooring was successfully redeployed at 14:05 in depth 95 metres on position  $53^{\circ} 46^{\prime} .919\text{N}$ ,  $5^{\circ} 38^{\prime} .056\text{W}$ . Following deployment of the rosette water sample 5 beam trawls were completed providing 4 samples. A single box core was taken successfully. At approximately 18:00 the decision was made to leave the offshore monitoring site and return to the MIK net stations with a plan to return to the offshore buoy in the morning and complete the box coring and other sampling duties. 3 MIK net samples were taken before the survey was terminated due to mechanical problems with the engine cooling system. During the survey it became apparent that mussel growth in the water cooling system was impeding flow. Despite the efforts of the engineers the situation had worsened during the survey resulting in the danger of overheating the engines.

### Friday 26<sup>th</sup> May

The vessel docked in Belfast at 08:00 and the scientists disembarked. The vessel remained in dock while an inspection and repairs to the cooling system were made. The vessel was pronounced fit to sail that evening and the plan was made to leave on Saturday morning.

### Saturday 27<sup>th</sup> May

With 4 scientific personnel onboard the RV Corystes left Belfast at 06:00 and headed directly for the first Gulf VII station. Sampling continued until 16:00 after which the vessel headed directly to the offshore monitoring site to complete the sampling there. Due to a mechanical problem with the box corer no further samples were collected. MIK net sampling recommence at approx. 21:00. The last MIK net station was completed at 04:00 and the vessel headed directly for Belfast, docking at 09:00 on Sunday morning. The remaining scientists disembarked.

### **CO 2306 Part II:**

#### Thursday 1<sup>st</sup> June

After a mid cruise break, which facilitated the removal of equipment and a change in scientific personal, the RV Corystes left Belfast at 13:00 and headed directly for the north eastern Irish Sea. In excellent sea conditions, which were to remain for the duration of the survey, the first MIK was deployed at 20:10. The RV Corystes continued to make good progress with a further 8 MIK stations completed before changing over to the Gulf VII at 05:00.

#### Friday 2<sup>nd</sup> June

In warm sunshine and calm seas the RV Corystes continued to make good progress. After the initial Gulf VII hauls it was apparent that clogging of the net was reducing filtering efficiency due to the high concentration of plankton. The 40cm nose cone was replaced with a 30cm nose cone to reduce clogging. At 21:19 the MIK net sampling resumed and a further 7 stations were completed during the night/early morning.

#### Saturday 3<sup>rd</sup> June

The progress made at this early stage was impressive, helped greatly by the exceptional weather conditions. A further 15 Gulf VII stations were completed with sampling taking place close to the eastern coast of the Isle of Man where the annual Manx TT road race was taking place. MIK net sampling resumed at 21:19 and a further 7 MIK stations were completed during the night /early morning. The inshore MIK stations (65, 58) along the eastern English coastline were removed from the sampling plan due to the shallow nature of their positions. A large catch of jellyfish (43Kg) at station 63 required the use of the crane to land.

#### Sunday 4<sup>th</sup> June

The weather remained glorious and progress impressive. A further 15 Gulf VII hauls were completed with catches dominated mostly by dab and dragonet larvae. The MIK net sampling resumed at 20:20 with a total of 8 stations sampled. In addition to the catches of juvenile whiting, found to be common throughout the eastern Irish Sea, a number of juvenile cod were caught south of the Isle of Man.

#### Monday 5<sup>th</sup> June

The vessel returned to the south eastern Irish Sea during the day to complete the Gulf VII stations in that region before making her way back to the western side. A total of 15 stations were sampled. The MIK net sampling resumed at 20:40 and a further 8 stations were completed. At an inshore station 43 a large haul of jellyfish was taken (32 Kg).

### Tuesday 6<sup>th</sup> June

The weather remained ideal for sampling and provided pleasant working conditions for all concerned. 15 Gulf VII stations were completed during the day and the MIK net sampling resumed at 20:00. A total of 5 MIK hauls were completed before midnight with large hauls of jelly fish taken (52Kg and 40Kg) at inshore sites 32 and 33.1. At 00:25 a MAYDAY was received from the FV Noronya. The RV Corystes being approximately 4nmiles away made immediately for the stricken vessel which was reported to be on fire. Once visual contact was made, the FV Noronya was seen to be on fire and a life raft was floating nearby containing the four fishermen who had abandoned the vessel. The RV Corystes launched her rescue craft and two crew members proceeded to pick up the surviving fishermen from the life raft. The RV Corystes remained on the scene and kept a constant watch on the burning vessel. A RAF helicopter had been scrambled to assist in the rescue of the fishermen but once it was evident that the four men were safe aboard the RV Corystes it returned to base.

### Wednesday 7<sup>th</sup> June

At approximately 10:00 hours the FV Noronya finally disappeared from the radar after a number of small explosions. The final demise of the vessel was not seen however as before she disappeared, presumed sank, a sea mist developed and covered her from view. A course was immediately set for Kilkeel, where arrangements had been made to rendezvous with an inshore RNLI lifeboat that would transport the men to Kilkeel harbour. At 12:20 the men boarded the RNLI lifeboat and were taken into Kilkeel harbour. The SIC would like to commend the Master and crew of the RV Corystes who conducted the rescue of the four men in a most professional manner. The RV Corystes set sail for Gulf VII station 1 and sampling resumed at 13:05. A further 7 Gulf VII stations were sampled before resuming MIK sampling with a further 8 stations completed.

### Thursday 8<sup>th</sup> June

The weather continued to impress all onboard, with Thursday one of the hottest days of the survey. Only 8 Gulf VII stations remained and these were completed by 12:30. As the MIK net sampling was not to begin until 20:00 the decision was made to use the time to conduct a limited diel study using the MIK net. The vessel made her way to station 29.3 and 1 MIK tow was made approximately every hour. A total of 5 tows were made providing data on diel movements and sampling variance. The remaining MIK stations were completed just after midnight and the vessel made her way to Belfast, docking at approximately 09:00 on Friday morning.

## **Results:**

### **CO 2106 Part I:**

During the first half of the survey a total of 34 Gulf VII and 29 MIK stations were sampled (Fig. 1). Despite poor weather conditions throughout the survey (wind speed 10-26 knots), and unforeseen mechanical difficulties, virtually all proposed stations were completed.

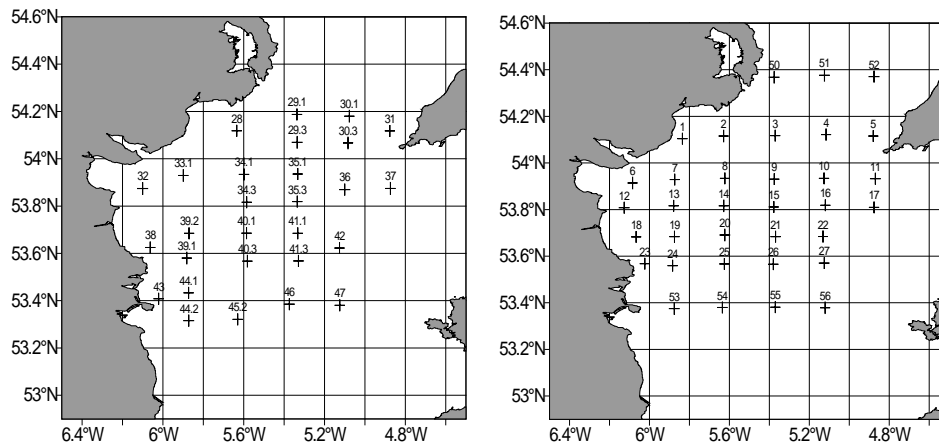


Figure 1. Mik net (left) and GulfVII stations (right) sampled during CO2106.

Approximately 180 737 l of seawater were sampled, leading to the capture and identification of 2 728 fish larvae and juveniles. Of those a total of 256 whiting, 71 haddock and 15 cod juveniles were identified, measured and preserved for future otolith increment research. In addition, from the 34 GulfVII stations a plankton sample was preserved in formalin for future study. A CTD probe attached to the GulfVII provided a vertical profile of the water column at each station. The onboard constant surface salinity and temperature logger was run throughout the first half of the survey.

From the MIK net hauls the abundance index was calculated for whiting, haddock and cod (Fig. 2). The abundance of juvenile gadoids in the water column depends on the initial numbers that reach metamorphosis and individual growth and mortality rates. Comparing the 2006 May indices with previous years showed that the haddock abundance index was the highest in the 10 year time series. Whiting and cod abundance indices however, were both below their time series averages.

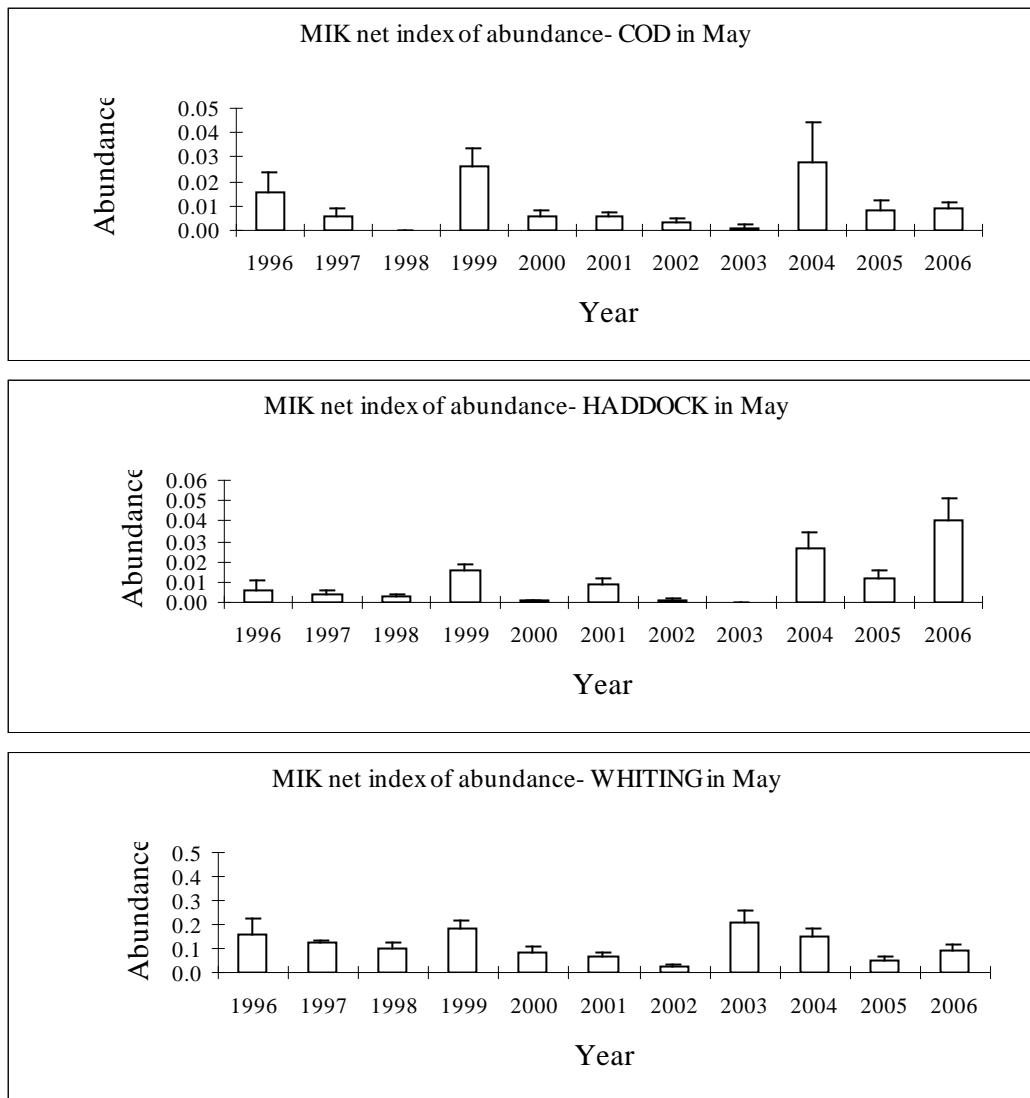


Figure 2. May juvenile gadoid abundance indices for cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and whiting (*Merlangius merlangus*) estimated from MIK net samples taken during CO2106.

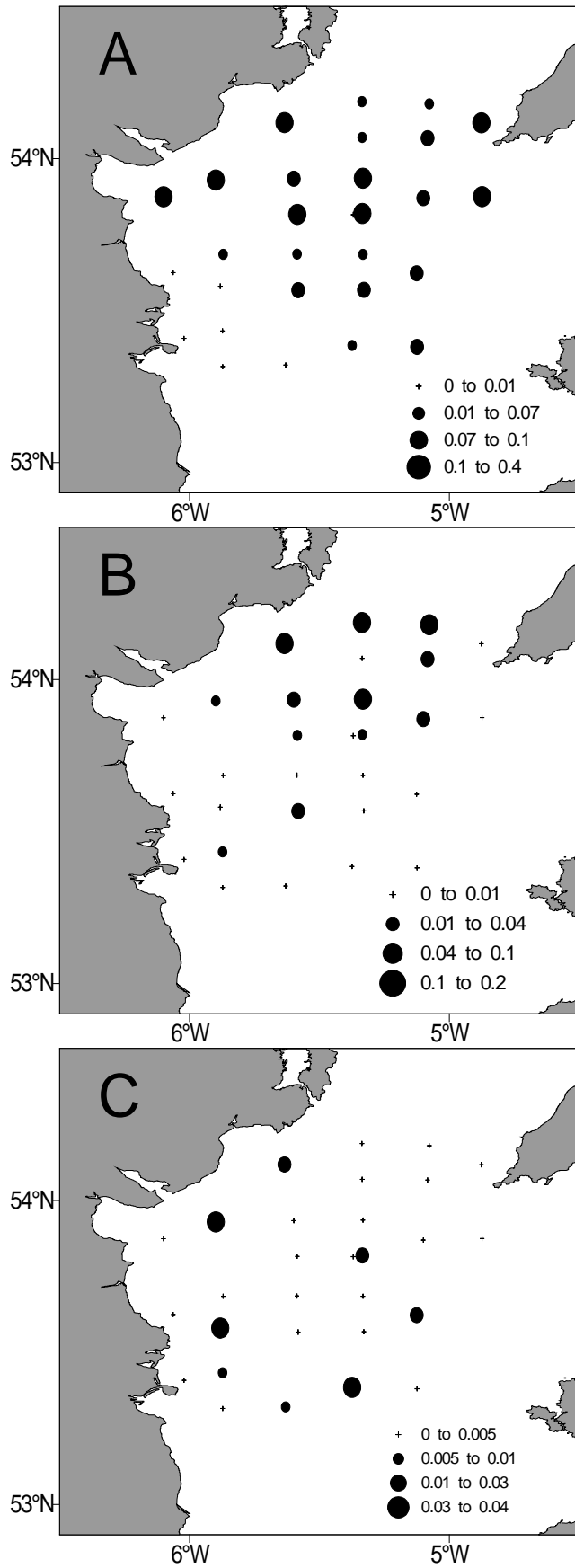


Figure 3. Spatial abundance ( $\text{ind.m}^{-2}$ ) of juvenile whiting (A), haddock (B) and cod (C) caught using the MIK net during CO2106.

Investigating the spatial abundance of the gadoid species showed that whiting juveniles were present throughout the survey area. Three possible centers of abundance were observed: Irish coastline, the south west of the Isle of Man and the central western Irish Sea. The length frequencies of the individuals captured at each of these sites suggested that the whiting present at the Irish coast and Isle of Man sites were from different cohorts, possibly originating from separate spawning sites (Fig. 4). The length frequencies from the central site suggested mixing of these apparently different populations. Further work is required to investigate if these are indeed individuals from separate populations.

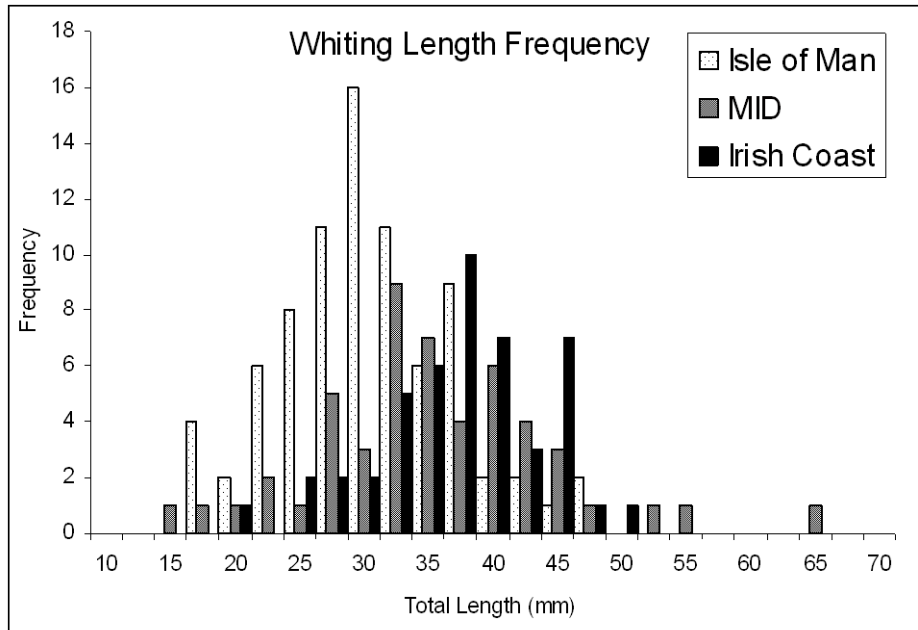


Figure 4. Length frequencies of whiting from 3 sites in the western Irish Sea: south west of the Isle of Man, Irish coastline and central western Irish Sea (MID). Refer to Fig. 3A for positions.

**Results:**

**CO2306 Part II:**

During the second part of the survey the eastern Irish Sea was also sampled. This provided new spatial and abundance data on juvenile and larval fish in this area. Subsequently a total of 86 Gulf II and 56 MIK net samples were taken resulting in the filtration of approximately 266 685 l of seawater. This resulted in a total of 3 949 fish larvae and juveniles being captured and identified. In total 699 juvenile gadoids were identified, measured and preserved of which the majority were haddock and whiting.





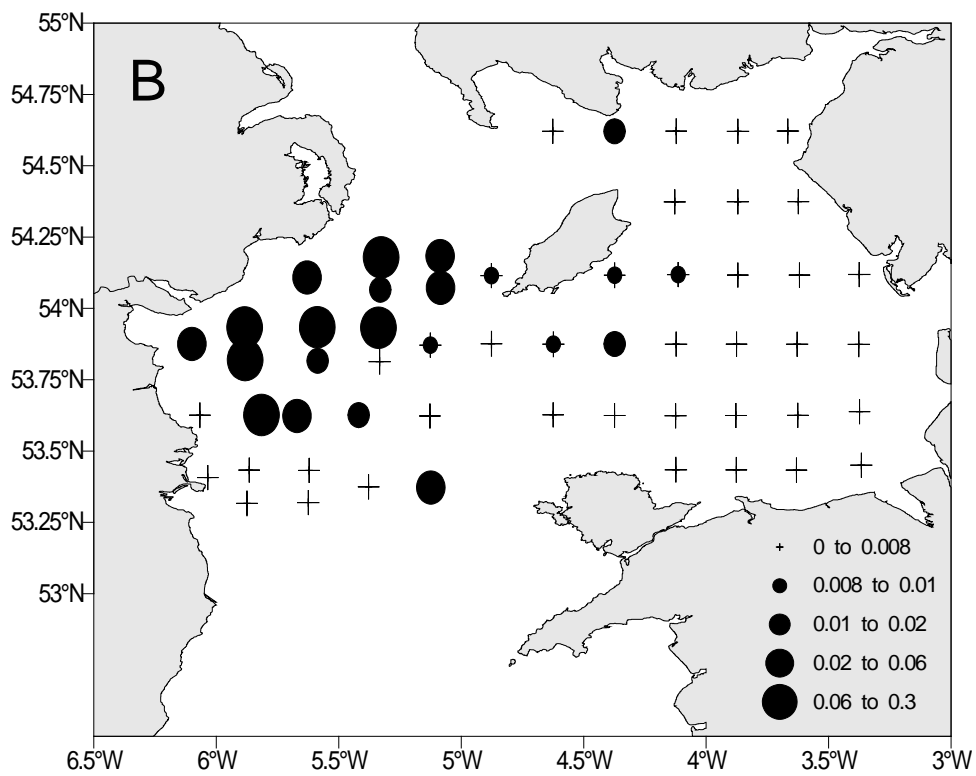
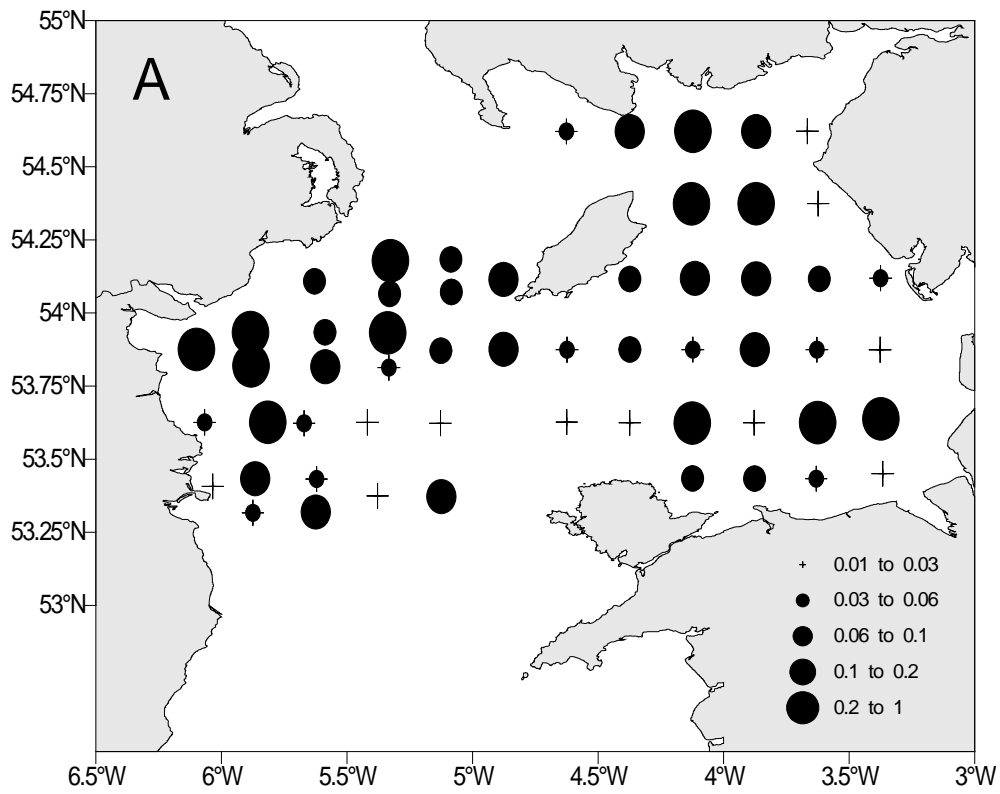


Figure 6.1. Spatial abundance ( $\text{ind.m}^{-2}$ ) of juvenile whiting (A) and haddock (B) caught during survey CO2306 by the MIK net.

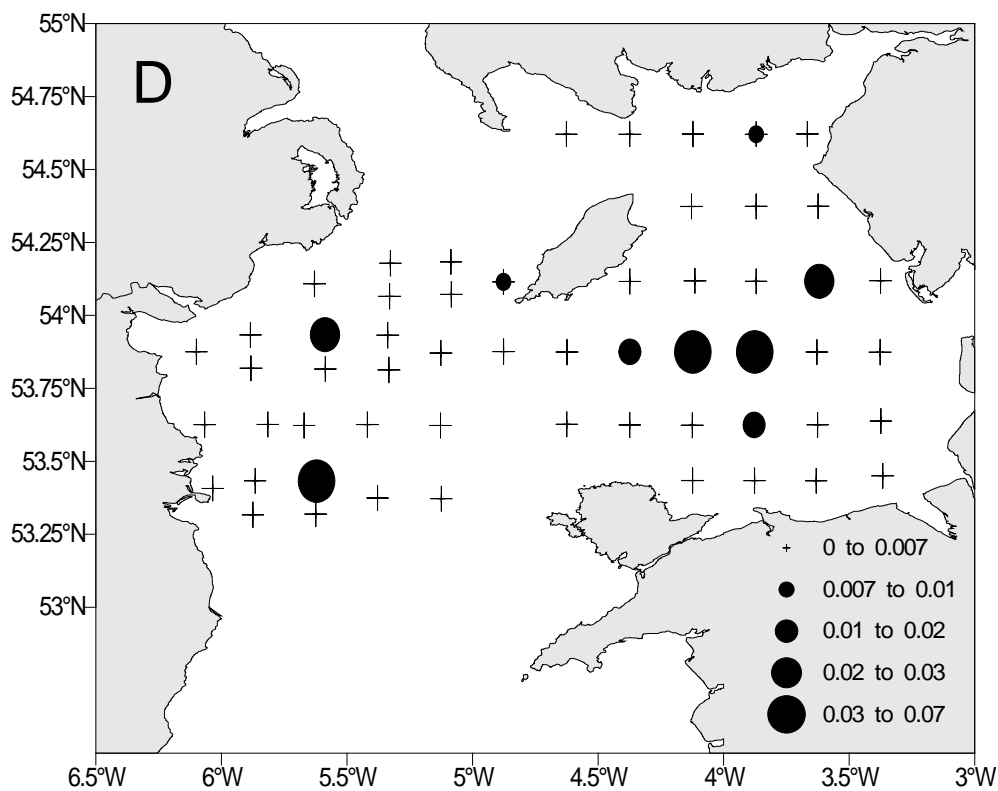
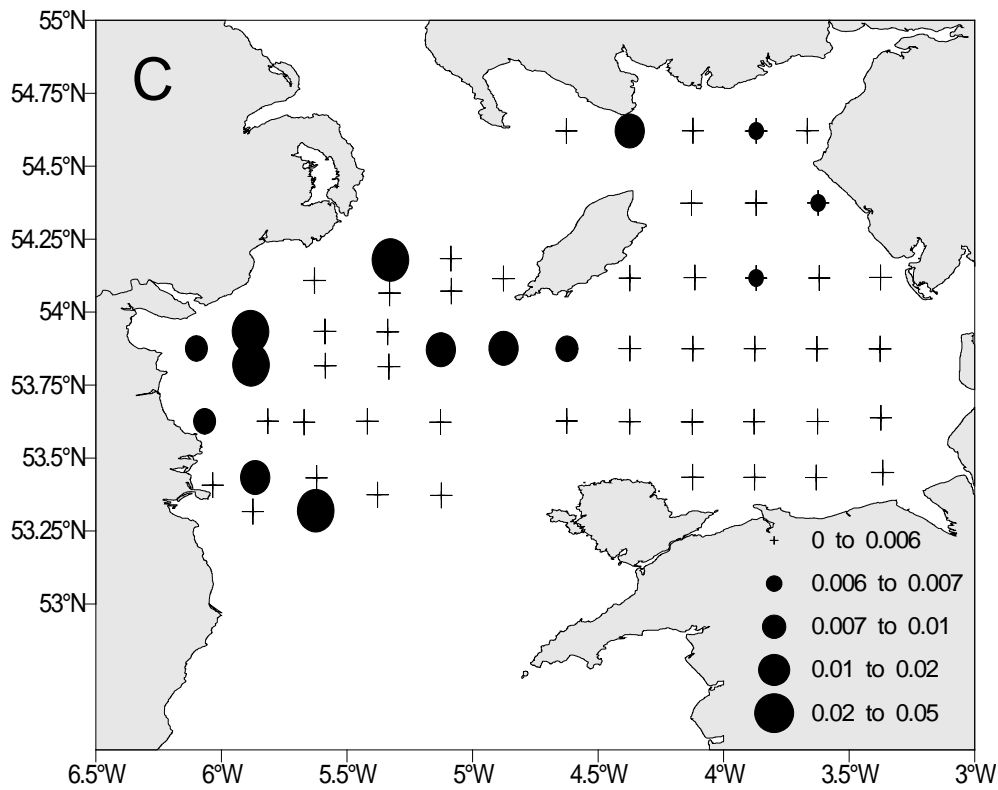


Figure 6.2. Spatial abundance (ind.m<sup>-2</sup>) of juvenile cod (C) and pre-settlement dab (*Limanda limanda*) (D) caught during survey CO2306 by the MIK net.

Investigation of the gadoid distributions showed that whiting were found extensively throughout the eastern Irish Sea (Fig. 6.1A). Cod were found in the north eastern area Irish Sea and to the south of the Isle of Man (Fig. 6.2C). Haddock were found to

the east of the Isle of Man with the vast majority caught in the western Irish Sea (Fig. 6.1B).

From the western Irish Sea stations the June MIK net abundance indices for haddock, cod and whiting were calculated (Fig. 7). Haddock indices remained high while cod and whiting were both relatively low, an annual trend evident since the last strong recruitment event of 1996.

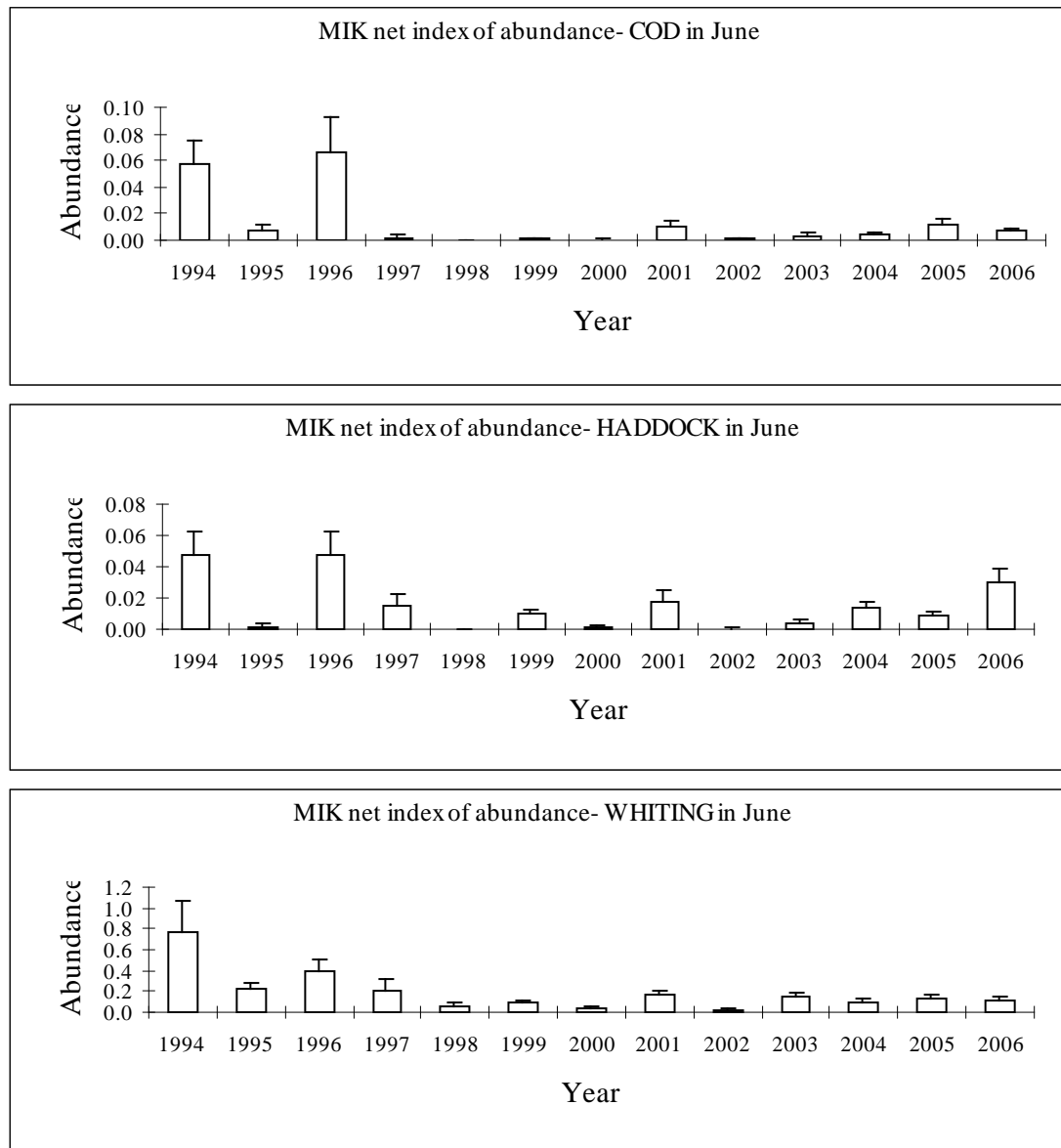


Figure 7. June juvenile gadoid abundance indices for cod, haddock and whiting estimated from MIK net samples taken during CO2306.

The indices calculated in June were much the same as those calculated from the late May survey, suggesting low mortality and/or low growth and subsequent settlement rates between the periods of sampling (Fig. 8). As whiting remain pelagic for longer than cod and haddock, their abundance indices have historically been similar between the May and June surveys.

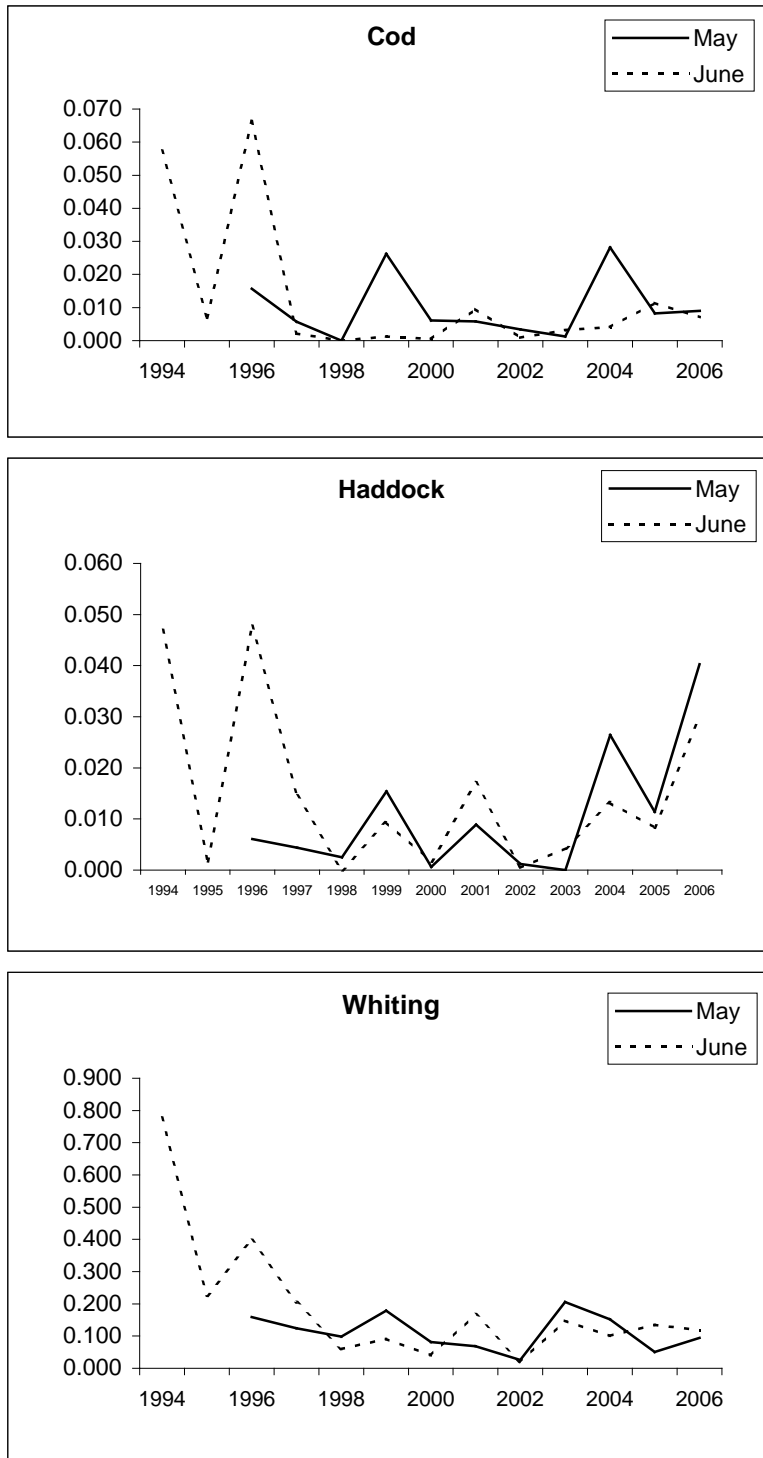


Figure 8. Time series of MIK net survey estimates of pelagic juvenile cod, haddock and whiting in the western Irish Sea from 1994 to 2006.

Combining both surveys (CO2106 and CO2306) the annual indices of abundance for cod, haddock and whiting were examined to continue the MIK net time series data set used in the annual ICES assessment process (Table 1). Due to the temporal variability in the settlement of both cod and haddock the series of abundance used to show likely year-class strength is constructed from the maximum estimate from that year (either May or June) (see Fig. 8). This is not the case with whiting, which remain

pelagic for much longer and therefore are always estimated from the June survey abundance.

<b>Year</b>	<b>Cod</b>	<b>Haddock</b>	<b>Whiting</b>
1994	57.4	47.0	777.9
1995	6.9	1.7	225.1
1996	66.3	47.8	397.0
1997	5.7	14.5	205.0
1998	0.0	2.5	59.3
1999	26.2	15.4	91.4
2000	6.1	1.7	39.8
2001	9.6	17.1	166.5
2002	3.4	1.2	19.1
2003	3.2	4.3	148.5
2004	28.2	26.4	100.7
2005	11.4	11.4	135.2
<b>2006</b>	9.0	40.2	118.2

Table 1. Time series of pelagic juvenile abundance of cod, haddock and whiting from 1994 to 2006. The fish are aged approximately 2-3 months and are caught just prior to settlement. (Nos. per 1000 m<sup>2</sup>).

The Gulf VII high speed plankton sampler provides data on the spatial abundance of smaller fish larvae and plankton. Fish larvae and ctenophores are removed from samples captured with the Gulf VII sampler. The larvae are identified and preserved while ctenophores are counted. The majority of fish larvae captured were identified as dab and dragonet (Fig. 9). Snakelike larvae, including the species *Ammodytidae* (sandeel) and *Sprattus sprattus* (sprat) with some *Pholis gunnellus* (butterfish) were also present. Fish larvae were found to be most abundant in the eastern Irish Sea, east of the Isle of Man and off the north Wales coast (Fig. 10). Ctenophores were most abundant in the western Irish Sea (Fig. 11).

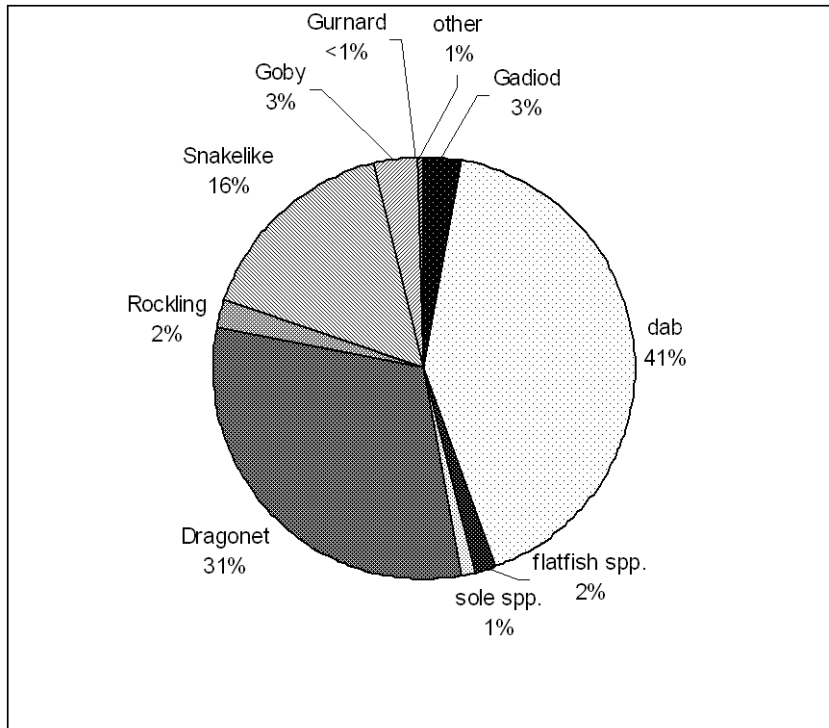


Figure 9. Pie chart showing percentage abundance (ind.m<sup>-2</sup>) of fish larvae species captured with the Gulf VII high speed plankton sampler during CO2306.

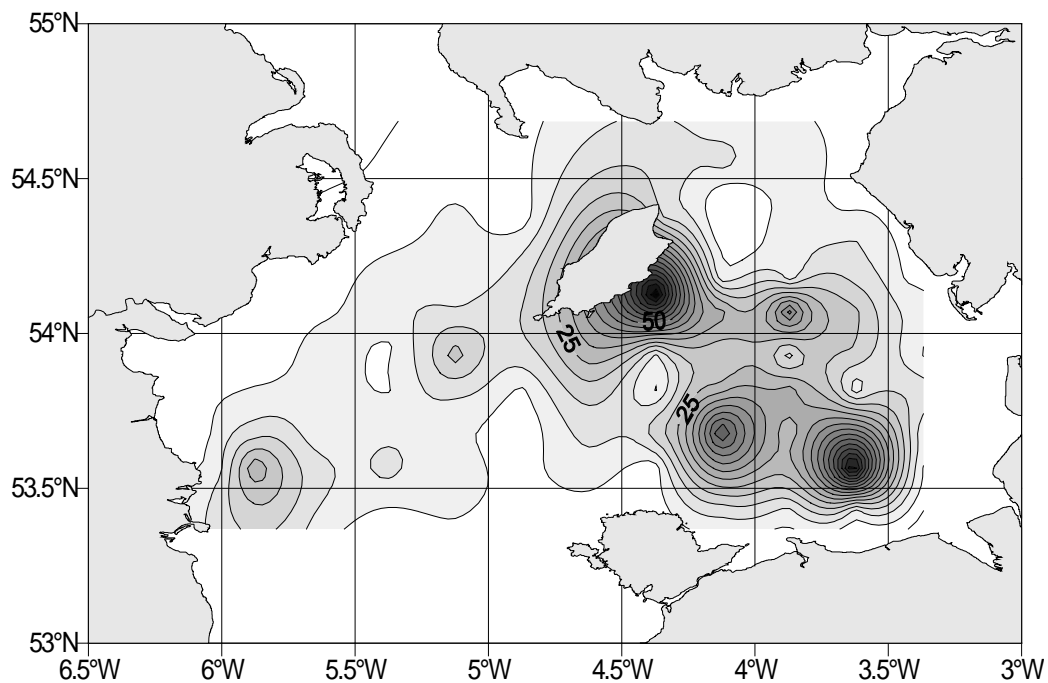


Figure 10. Spatial abundance (ind.m<sup>-2</sup>) of fish larvae captured with the GulfVII high speed plankton sampler during CO2306. Maximum abundance 91.6 ind.m<sup>-2</sup>.

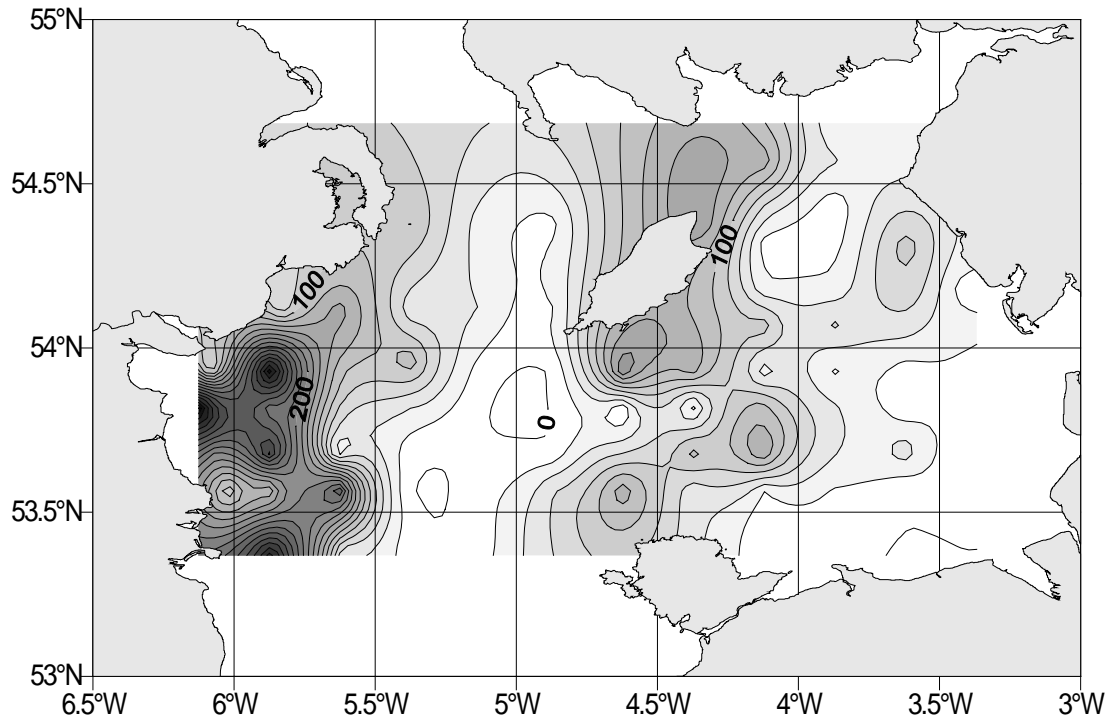


Figure 11. Spatial abundance ( $\text{ind.m}^{-2}$ ) of ctenophores captured with the Gulf VII high speed plankton sampler. Maximum abundance  $401.6 \text{ ind.m}^{-2}$ .

**Acknowledgements:**

The SIC would like to thank all the scientists for their cooperation and diligence in carrying out the work. This survey being a joint operation requires non fishery scientists to carryout work not normally included in their remit and they are thanked for their professional and enthusiastic assistance. The master and crew of the RV Corystes are thanked for their assistance with all aspects of the survey. In particular the efforts of the engineers and assisting staff are thanked for their efforts in rectifying the mechanical problems encountered during the survey enabling the work to be completed.

**Signed:**

SIC:

Head, Aquatics:

Date:

Date: