Department of Agriculture and Rural Development (Northern Ireland)
Agriculture and Environmental Science Division

Cruise Report: CO 2205
Vessel: RV *Corystes*
Date: 25th – 30th May 2005
Area: Irish Sea (north); ICES div.VIIa
Survey Type: Biological Oceanography, Mooring Service & Juvenile Gadoid Survey

Personnel:

B Stewart (SIC)	SSO	DARDNI
S Beggs	SSO	DARDNI
J Peel	ASO	DARDNI
P McCorriston	ASO	DARDNI
P McShane	ASO	DARDNI
S.J. Philips	TASO	DARDNI

Objectives:

i. To maintain a nutrient and remote monitoring programme at mooring stations38A and 47D.

ii. To assess temperature, salinity and nutrient distributions over depth at stations 38A and 47D.

iii. To investigate summer transport of pelagic juvenile gadoids from coastal regions to stratified waters in the western Irish Sea.

vi. To assess fish growth rates in mid may.

vii. To assess juvenile fish for histological examination of growth and condition.

Cruise Narrative:

Wednesday 25 May 2005
In preparation for the cruise, all DANI scientific crew were onboard by 2000 hrs when mooring components and the automated sampler were prepared for deployment. Following a talk on ship's safety and a demonstration of personal life saving equipment, the RV *Corystes* departed Belfast at 2100 hrs and sailed overnight in a light westerly breeze towards the mooring site at station 38A.

Thursday 26 May 2005
The vessel arrived on the mooring site at 0600 hrs. The weather was dry with a light south-westerly wind when work for the day started at 0800 hrs with the complete instrument mooring eventually recovered to ship deck at 0825 hrs. The mooring components were serviced, instruments downloaded and reprogrammed. Samples

were removed from the "biological" water sampler and the instrument rebuilt and programmed before redeployment at 1305 hrs in depth 93m on position 53^0 46^l .770N 05^0 38^l .040W. The rosette water sampler and zooplankton net were then deployed. The vessel then sailed to arrive at the inshore mooring station 47D at 1515 hrs when the instrument mooring was recovered to ship deck at 1530 hrs. Following a thorough service the mooring was redeployed at 1605 hrs in depth 29m on position 53^0 44^l .422N 06^0 04^l .031W. The rosette water sampler and zooplankton nets were deployed. Work continued with the juvenile gadoid survey using the Gulf VII to sample during daylight and the MIK net to sample during the hours of darkness.

Friday 27 – Monday 30 May 2005

Work continued around the clock with the juvenile gadoid survey, which was successfully completed late Monday afternoon. The vessel then sailed to dock in Belfast at 1430 hrs with scientific personnel disembarking at 1500hrs.

Parameters Monitored:

The CTD/rosette water sampler was deployed at stations 38A, 47D to acquire nutrient, chlorophyll *a*, temperature, light and salinity data from the depth profile. Three zooplankton net hauls were taken at stations 38A & 47D.

During the juvenile gadoid survey CO 2205 the MIK net and Gulf VII were deployed along a grid of stations in the north western Irish Sea to assess the abundance and spatial distribution of juvenile fish.

Moored Instrumentation:

The McLane water sampler deployed at depth 20 metres functioned as programmed with the exception of the period 21 January to 28 February. During that period the sampler was lost from the mooring following a collision with an unknown vessel. The mooring was repaired and sampler replaced during the February NMMP cruise (CO 0905; SIC Dr. M Service). Aside this, duplicate samples, for nutrient analysis, were taken every second day during the reporting period 15 Nov' 2004 – 30 May 2005. Temperature data recorded at 3 hourly intervals was recovered during each mooring service from seven thermistors positioned at intervals throughout the water column. Temperature, salinity and fluorescence data recorded at 15 minute intervals was recovered during each mooring service from CTD's positioned at near surface and near bottom at station 38A. Currently no instruments are deployed on the station 47D mooring.

Summary of Results:

Biological Oceanography: Station 38A

Data from the survey cruises during the period 15 November 2004 – 1 June 2005 demonstrate the changing cycle from the demise of the thermocline reported in September 2004 through to the period of the spring bloom in April/May 2005. Nutrient profiles from November, January and February show a steady increase in nutrient concentrations throughout the profile, typically from 4.5 to 7.5 micromoles inorg N l^{-1}. High-resolution nutrient data from the moored water sampler support this observation and identifies the winter "max" as occurring in mid March, almost four weeks earlier than last year. During April the surface layers of the water column are gradually depleted of nutrients as they fuel the spring bloom. Increased chlorophyll

levels in these layers, typically 6 – 9 micrograms chlorophyll l^{-1}, show evidence of the increase in biomass. Further depletion of the water column continues throughout May as up-welled nutrients are taken up during the spring bloom. CTD profiles from November, January and February are isothermal and show gradual loss of 5 ^{o}C over the winter months. April's profile indicates the first sign of surface warming and is followed in early May by the development of a weak thermocline which is further strengthened towards the end of May. High-resolution temperature data from the moored surface and bottom thermistors show surface warming beginning in mid March. This coincides with the onset of nutrient depletion of the upper layers and the initiation of the 2005 spring bloom.

Biological Oceanography: Station 47D

An often-complex situation arises at this inshore station owing to the direct freshwater influence from the River Boyne. However during the survey period the pattern was similar to what occurred offshore. TD profiles for November, January and February are generally mixed and show a gradual loss of 4.5 ^{o}C over the winter months with temperatures 1 – 2 ^{o}C below those recorded at the off shore site. Nutrient values during this period show a sharp increase form typically 5 to almost 9 micromoles inorg N l^{-1}. CTD profile data from April, early and late May are mixed and show progressive warming. Nutrient data for this period show some nutrient depletion in April with a residual 3 – 5 micromoles inorg N l^{-1} in the water column with almost total depletion of inorg N occurring during May. This is a similar pattern to what occurred off shore and despite the absence high-resolution data from moored instrumentation at this site it indicates a similarity in the timing of the spring bloom.

Gulf VII & MIK net Survey Results:

During the juvenile gadoid survey CO2205, all 34 Gulf VII stations and a total of 25 MIK net stations were successfully sampled (Figure 1). In total from both juvenile gadoid cruises CO 2005 and CO 2205 over 156000 litres of seawater were sampled, leading to the capture and identification of 1553 fish, which were preserved for future analysis. Of those a total of 310 were identified as being cod (*Gadus morhua*), whiting (*Merlangius merlangus*) or haddock (*Melanogrammus aeglefinus*).

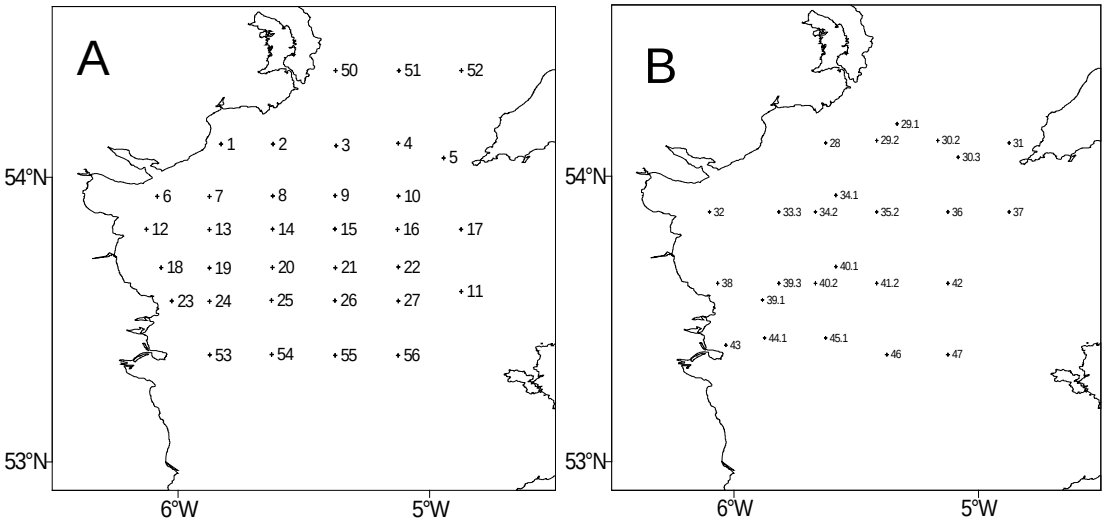

Figure 1. Positions of GulfVII stations (A) and MIK net stations (B) sampled during cruise CO2205.

Despite the continuing un-seasonal weather the MIK net survey was completed, thereby providing coverage of all 5 strata. The abundance index was up slightly for cod on the previous 3 years, while whiting and haddock indices were relatively similar to previous year's results.

Spatial distribution diagrams showed that cod juveniles were associated with more coastal locations. Whiting where dispersed through the sampling area while haddock also seemed to be more patchily distributed. Dab distributions were centred around a single area of abundance and look to have been retained in the area of the seasonal cyclonic gyre. Both cod and dab distributions seemed to have moved northwards since the previous cruise two weeks earlier (CO2005).

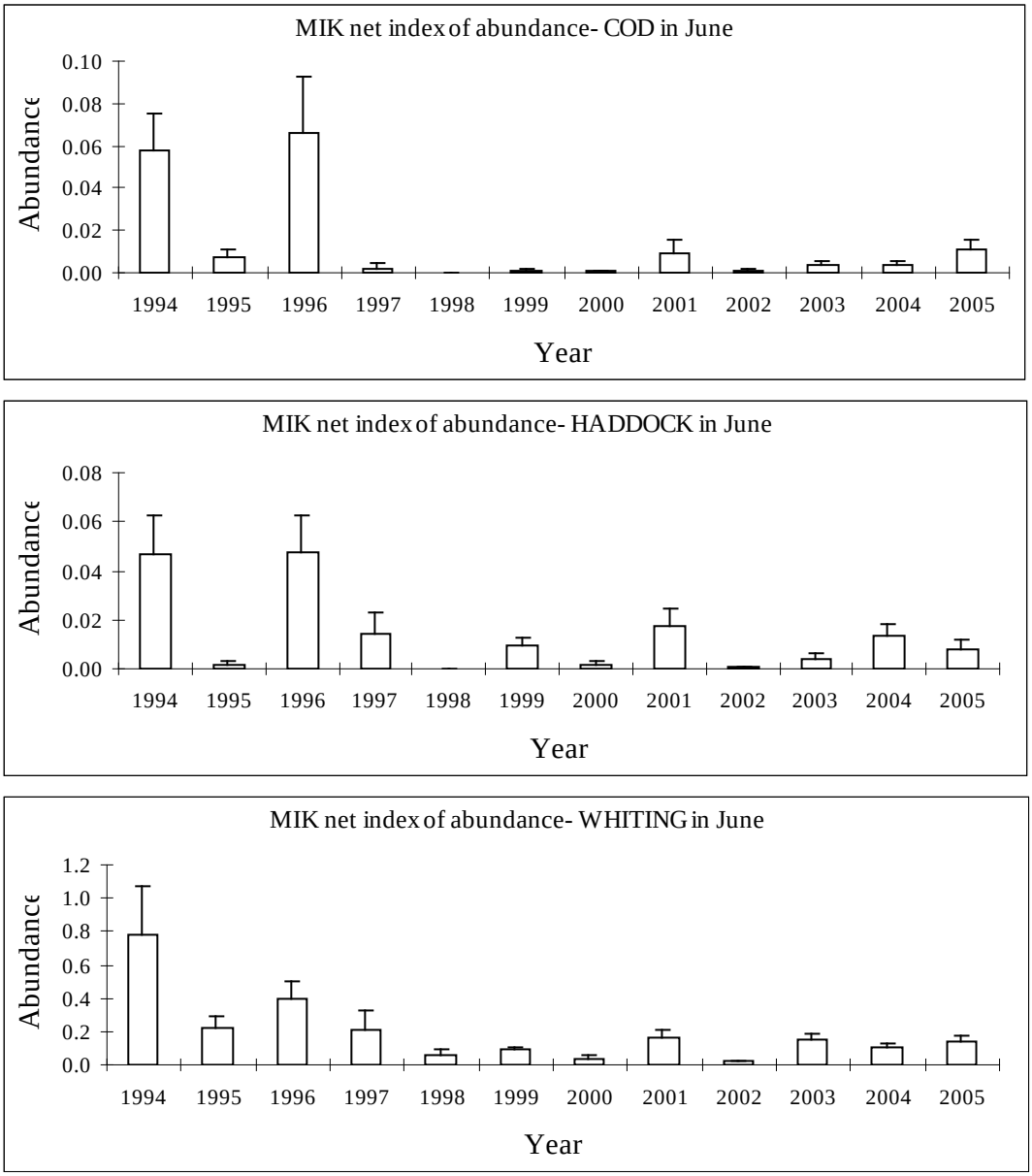

Figure 2. Time series of abundance indices of cod (*Gadus morhua*), whiting (*Merlangius merlangus*) and haddock (*Melanogrammus aeglefinus*) estimated from June time cruises from 1996 to 2005.

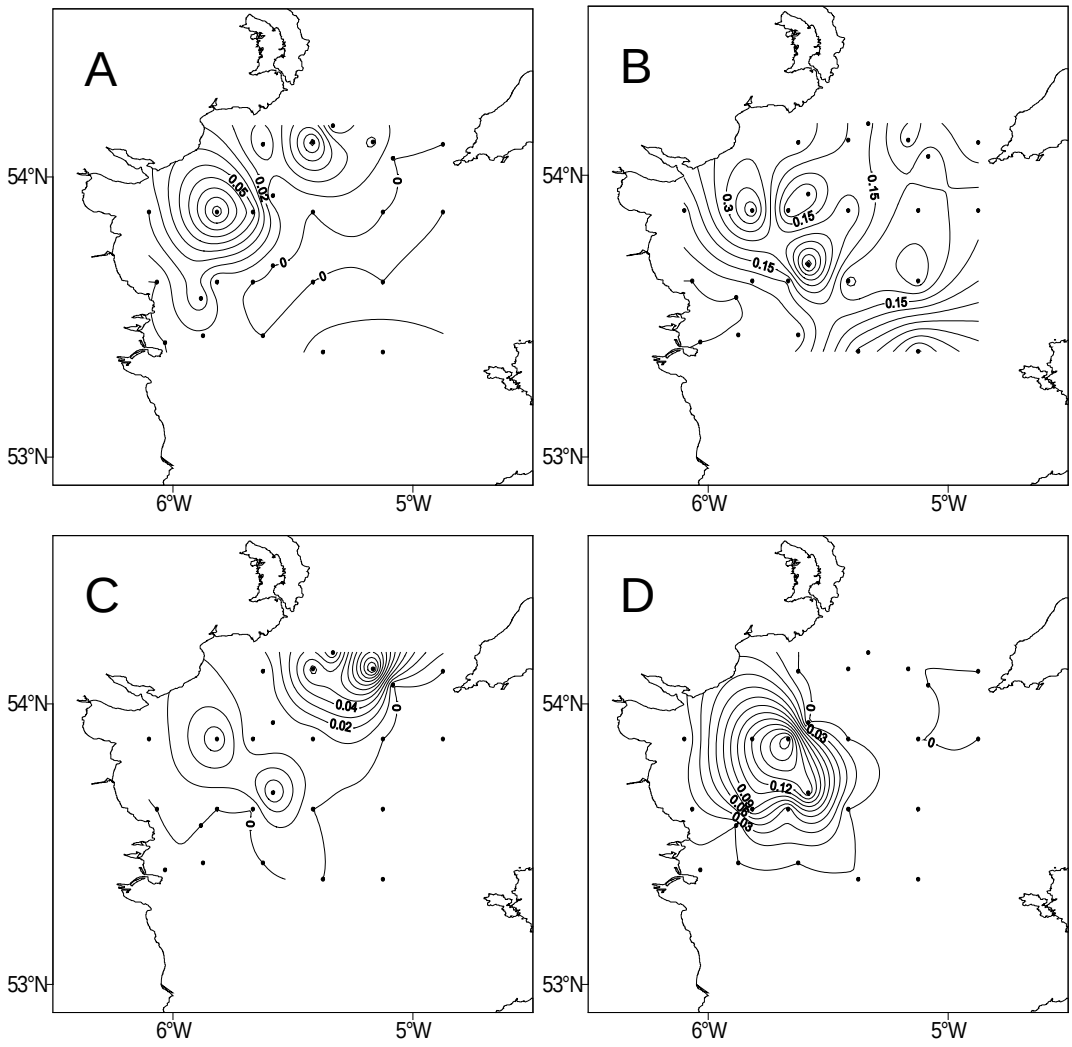

Figure 3. Spatial distribution of juvenile cod (A), whiting (B), haddock (C) and pre-settlement dab (*Limanda limanda*) (D) caught during cruise CO2205 by the MIK net.

Combining both cruises CO2005 and CO2205, the annual indices of abundance for cod, haddock and whiting where calculated to continue the MIK net time series data set (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). This is not the case with whiting, which remain pelagic for much longer and therefore are estimated from the June survey abundance.

Year	Cod	Haddock	Whiting
1994	57.4	47	778
1995	6.9	1.7	225
1996	66.3	47.8	397
1997	2.1	14.5	205
1998	0	0	59
1999	1.3	9.4	91
2000	0.5	1.7	40
2001	9.6	17.1	167
2002	0.9	0.5	19
2003	3.2	4.3	149
2004	33.2	30.4	100.7
2005	**11.4**	**10.2**	**135.2**

Table 1. Time series of pelagic juvenile abundance of cod, haddock and whiting from 1994 to 2005. The fish are aged approximately 2-3 months and are caught just prior to settlement. (Nos. per 1000 m^2).

Abundance estimates of both juvenile cod and haddock were down on 2004 and below their respective means of 16.1 and 15.4 for the 12 year series. Whiting were up on 2004 with a similar estimate to 2003, but again below the time series mean of 197.2.

Hotel Report & Operational Aspects of the Ship:
During the cruise the A-frame, main trawl winches, both hydrographic winches and the ship's clean seawater supply were used. No problems were encountered with the ship's equipment nor indeed with any of the scientific equipment. The hotel and catering service was of the usual high standard and there was a good working relationship between the scientists and the ship's crew. Prior to the ship departing Belfast a comprehensive and detailed safety briefing was delivered to the scientific crew.

Acknowledgements:
Special thanks are due to Steven Beggs for providing comprehensive reports for cruises CO 20 2005 and CO 222005.

I am indebted to the deck crew of the RV Corystes for their co-operation and assistance during the mooring recovery and deployment operations. The ship's master, officers, engineers and catering staff are also thanked for their co-operation during these cruises.

B M STEWART

28 July 2005