CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE LOWESTOFT LABORATORY, SUFFOLK, NR33 0HT

2008 RESEARCH VESSEL PROGRAMME

REPORT: RV CEFAS ENDEAVOUR: CRUISE 4/08.

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DURATION: 22 February – 2 March 2008

LOCATION: Irish Sea

AIMS:

1. To conduct a series of plankton surveys using a 76cm Gulf VII plankton sampler, Bioness multinet and hyperbenthic sledge to estimate the abundance and distribution of plaice eggs and larvae in the plaice spawning area in Liverpool Bay. Dispersion of egg mass to be modelled in real time, with daily predictions being relayed to the research vessel to allow continuous assessment of the continued appropriateness of the sampling grid applied.
2. To use various trawls and acoustics to estimate the abundance and distribution of predators of plaice eggs and larvae in the plaice spawning area in Liverpool Bay.
3. To sample potential predators for detection of plaice eggs and larvae prey, using genetic probes.
4. To collect fin clips of adult dab and flounder for population genetic studies. (Dr B. Lyons)

NARRATIVE:

RV CEFAS ENDEAVOUR sailed from Belfast at 19:00h, 22 February following a 10 hour delay due to crew illness and gale force winds. The strong westerly winds forced a change of the original plan and it was decided to work on an egg patch in the western Irish Sea, determined on CEFAS ENDEAVOUR 2/08. A grid of eighteen plankton stations (Fig 1) was begun east of Dundrum Bay just after midnight. Good progress was made working in sheltered waters down the Irish coast, although Valeport CTD software problems caused delays on most stations. The plankton grid was completed just before midnight, 23 February with the majority of plaice and cod-size eggs being found in the centre of the grid off Drogheda Bay. Trawling, with a Portuguese High Headline Trawl (PHHT), began in this area shortly after daybreak the

following day in an attempt to capture potential predators of these eggs. Stomach sampling protocols were established and sampling conducted for subsequent DNA analysis of individual fish (and various invertebrate species) stomachs (Table 1). Three, 20-30 minute trawl hauls were fully processed before CEFAS ENDEAVOUR steamed overnight to the eastern Irish Sea to work on a plaice egg patch in Liverpool Bay (as originally planned), and to seek some shelter from a severe southerly gale which was imminent.

Plankton sampling began the next morning (25 February) north of Anglesey, following a delay of two hours due to further Valeport software problems. These problems persisted, but the grid of twelve stations (Fig 1) was eventually completed just after midnight. After sheltering from severe gale force winds in Red Wharf Bay overnight, trawling began at 07:30h the next morning. Three further trawl hauls were completed in the lee of the N. Wales coast during the day to collect samples of stomachs to identify potential predators of plaice eggs. Trawling continued at 06:00h the following morning, (27 February) (again in Red Wharf Bay) in an attempt to collect feeding sprats in hours of darkness, as most sprats sampled the previous day had empty stomachs. Three further 30-minute PHHT deployments were made further offshore during the day, with large numbers of herring (max 0.46t) and whiting (max 0.27t) being caught on some stations. An overnight acoustic survey was then begun at 18:45h in an attempt to locate patches of plaice eggs and aggregations of fish, on which to sample potential predators the next day.

Six acoustic NW-SE transect lines, 12nml long and 2nml apart, were completed by 07:50, 28 February. This acoustic grid located a dense patch of plankton and fish around 53° 30'N, 03° 35'W. Following a more detailed inspection of the bottom topography a trawl haul (Stn 43) was completed in this area during the morning, with reasonable numbers of herring and whiting being caught. The rest of the day was spent repairing and preparing the Bioness multinet for deployment, but unfortunately this was not possible before a second planned acoustics grid was begun at 19:30h. This grid ran almost perpendicular (SW-NE) and at similar spacing to the first grid, in an attempt to better define the plankton and fish patches.

The second acoustic grid was completed by 07:40, 29 February. The plankton patches and largest aggregations of fish were in a similar position to those of the previous day. Unfortunately the weather had deteriorated and it was no longer possible to deploy the Bioness net. However, three hyperbenthic sledge tows were made close to the trawl position (Stn 43) of the previous day. Each hyperbenthic sledge deployment produced four plankton samples, which were sorted whilst fresh for potential predators of fish eggs and larvae, although none were found. By midday, the weather had worsened to a SW force 9 severe gale, preventing any more work in the area and CEFAS ENDEAVOUR steamed for the shelter of Red Wharf Bay where the ship anchored at 16:00h.

The severe westerly gale continued through to the next morning, and with little prospect of further work, the anchor was weighed and CEFAS ENDEAVOUR set sail for Swansea where she docked at 11:30h, 2 March.

RESULTS:

Aim 1:

A Gulf VII plankton sampler, fitted with a 40cm aperture nosecone and 270μm mesh net was used on 30 stations during this survey (Fig 1). A Valeport CTD mounted on the sampler,

provided ‘real time’ flow-meter data as well as salinity and temperature profiles for each double oblique plankton haul. The Valeport CTD system caused numerous problems throughout the survey, with valuable time being lost on almost every deployment.

A new ESM2 environmental data-logging package was mounted on the plankton sampler for most deployments. It provided an environmental data back-up to the Valeport CTD and will enable some cross-calibration of both systems. It also recorded a wide range of environmental parameters (temperature, salinity, fluorescence, oxygen, turbidity and light) together with some information on Gulf VII performance (pitch and roll). The system performed extremely well and may be utilised on more of the Irish Sea egg surveys later in the year.

The hyperbenthic sledge was used on three, 5-10min deployments in an area of greatest plankton density (identified by acoustics) in Liverpool Bay. Potential predators of fish eggs and larvae were scarce in these samples, which were dominated by small arrow worms (*Sagitta* spp.).

Aim 2:
A Portuguese High Headline Trawl (PHHT), which was towed for 20-30 minutes in areas of high egg abundance, was fitted with a tickler chain and fine mesh liner. It was used on 12 occasions to estimate the distribution and abundance of predators of plaice, cod and haddock eggs and larvae. The catches were sorted into species, weighed and a representative length distribution obtained using the electronic data capture (EDC) system.

Recordings from a calibrated EK60 scientific echosounder were used to describe the spatial distribution of relative density of fish on two 12h surveys covering the known spawning distributions of plaice in Liverpool Bay. The majority of acoustic fish schools observed were typical of sprat and herring. Other acoustic aggregations were found close to the seabed and were believed to consist mostly of whiting. Figure 2 shows the distribution of fish densities for each nautical mile recorded during the two survey grids.

Aim 3:
The stomachs of 856 individual fish, over the length range, were removed and (95 whole invertebrate animals) frozen for subsequent DNA analysis to identify potential predators of plaice, cod and haddock eggs and larvae. A summary of the numbers of stomachs taken by station, by species is given in Table 1.

Aim 4:
Fin clips were taken from 55 dabs and 14 flounders from selected PHHT stations, for population genetic studies.

Miscellaneous:

a) The sub-surface (3m) thermo-salinograph was run throughout this survey and was continuously logged to the shipboard computer. Salinity sample were taken at each plankton station to provide samples for calibration of the Valeport CTD and ESM2 logger.

b) The Gulf VII plankton samples were analysed for the presence of jellyfish prior to fixation. Individual jellyfish (0.5 - 3mm diameter) were removed from the samples (up to a maximum of 10 per station) and preserved in ethanol for subsequent microscopic

identification. The remaining jellyfish in each sample were counted and their similarities to those already picked out assessed. All the juvenile jellyfish appeared to be fairly consistent colour and size suggesting the presence of only one species. All but one of the jellyfish observed came from samples in the western half of the Irish Sea and the majority were obtained from the northerly inshore stations on the grid.

c) An observer from the Irish Whale and Dolphin Watch group was on the lookout for cetaceans throughout daylight hours during the survey. The only cetaceans observed were seven Harbour porpoises, all occurring in the western Irish Sea.

S. Milligan
Scientist in Charge
2 March 2008

SEEN IN DRAFT

Master: Capt. R. McCurry
Senior Fishing Mate: Mr. A. Simpson

INITIALLED: Dr. E. Hunter

DISTRIBUTION:
Basic List +
Graeme Hays (Swansea University)
FCO (for Republic of Ireland)
Sea Fisheries Committees:
Cumbria
North Western and North Wales
South Wales

Figure 1.

C Endeavour 4/08 23 Feb - 2 Mar 2008

Plankton stations (numbered), PHHT stations Black triangles

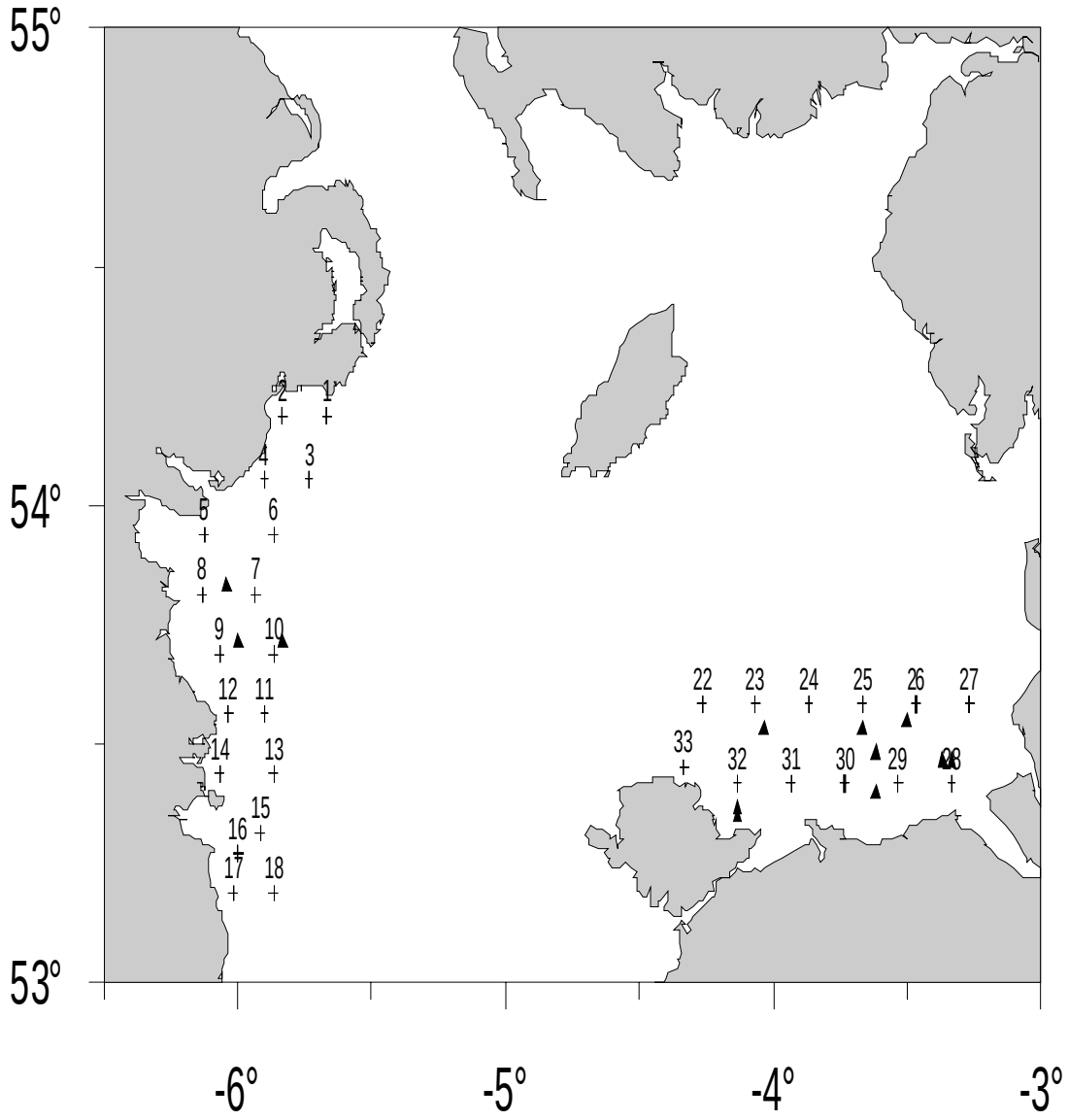

Figure 2.

C Endeavour 4/08 23 Feb - 2 Mar 2008

Acoustic grids in Liverpool Bay showing relative fish density

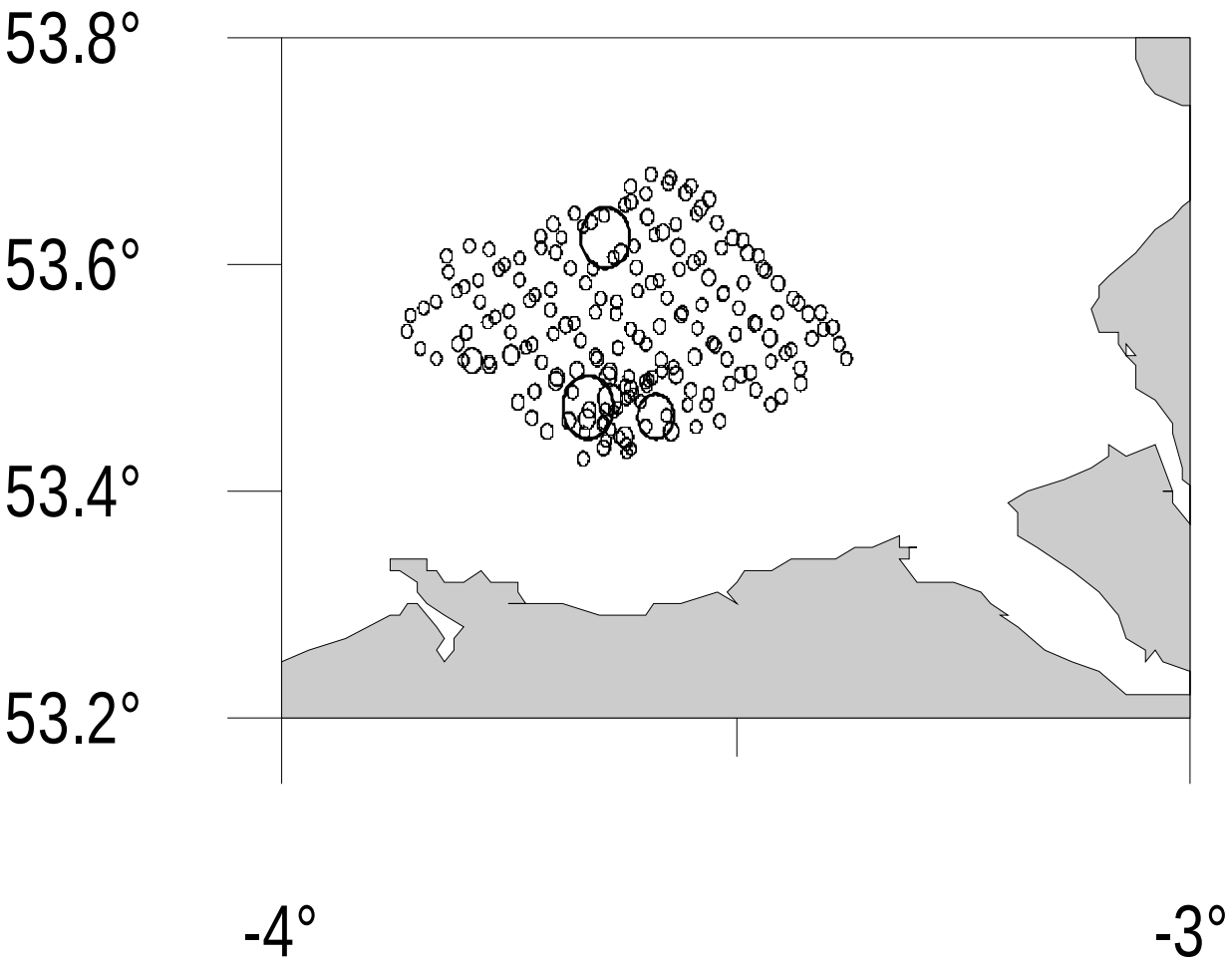

Table 1. C Endeavour 4/08 Stomach and predator samples

	Station No.												
Species	19	20	21	34	35	36	37	38	39	40	41	43	Total
Sprat	10	20	10	20	20	20	20	20	20	13	20	20	213
Herring		10	10	20	10	10	20	20	20	20	20	20	180
Whiting	8	11	10	5	2	10	10	10	10	10	10	10	106
Dab	10	8	10	3		10	10	10		10	2	10	83
Plaice	10	5	2			6	2	1	10	10		5	51
Grey gurnard		10	2			9	7	2		1		7	38
Poor Cod		10		1		8				10	1	3	33
Flounder						4			10	8		1	23
L. S. Dogfish							1		11	4		7	23
Other Fish Spp.													106
Invertebrates													95
											Total		951