MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1994 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 11/94
(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF: B E Spencer (SIC)
I Laing
T Beard
M J Kaiser
D B Edwards
R P Flatt
K Ramsey (UCNW)

DURATION: 23 September-5 October 1994

LOCALITY: Irish Sea

AIMS:

1. To survey the sea bed and sample benthos at the experimental site off Anglesey (ref. 53.25.539N; 04.01.548W) fished intensively with a beam-trawl fitted with chain mat in April 1994.

2. To beam trawl and sample the experimental site along the four lines designated for frequent fishing disturbance (two times per year) using two intensities of fishing (x 10 and x 20 tows).

3. To estimate the survival of animals caught in the cod-end using the on-board survival system over a prolonged period.

4. To film predators attracted to a baited camera frame and/or video camera on sledge on the sea bed using various components of the by-catch.

5. To quantify the number of macroepibenthic animals moving onto trawled tracks by sampling with a 3-m beam trawl.

6. To measure the survival of animals which pass through the mesh of the beam trawl.

NARRATIVE:

Five of the scientific staff joined the ship at Lowestoft on 23 September. CORYSTES sailed at 1030 h that morning arriving at the experimental site off the North Wales coast in the late afternoon of the 25 September. Side scan sonar runs over the 4 m beam trawl lines made in April 1994 showed no evidence of their persistence

On 26 September, Mr Laing and Ms Ramsey embarked via searider at Amlwch. Day grab, benthos dredge and 3 m beam trawl samples were taken from the E/W lines prior to commencing 4 m beam trawling.

On 27 September, the line 10E/W was trawled 10 times with catches of small sole, dogfish, gadoids (cod and pout), fairly common. The epibenthic community in general was similar to that seen in April 1994. The line was resampled with Day grab, benthos dredge and 3 m beam trawl. The 4 m beam trawl and other pieces of sampling gear were fitted from time to time with an acoustic tag to determine their position relative to the ship.

On 28 September, 20 beam trawl tows on 20 E/W were completed after ca. 15 h of fishing. Total catch averaged about 3 baskets per tow. Epibenthos sampling with the 3 m beam trawl before and after fishing with the 4 m beam trawl showed a significant decrease in abundance of starfish and increase in hermit crabs. Survival experiments were set up in tanks of flowing sea water with, hermit crabs, whelks and scallops. The fished line was sampled with the Day grab and benthos dredge. In the evening a video camera attached to a frame, baited with mixed by-catch (fish, crabs, queen scallop), was deployed on the fished line for several hours. Scavenging hermit crabs were abundant and were attracted to the bait within 10 minutes. Apart from a few fish, other scavengers were scarce.

Damage to the side scan sonar cable prevented use of the equipment for the rest of the cruise.

On 29 September, Day grab and benthos dredge sampling on the trawled line 10N/S was completed. Deployment for 24h of two stills cameras baited with dragonets or crushed sea urchins (*Psammechinus miliaris*) was made on the trawled line. In the evening, a start was made with trawling line 20 N/S which continued overnight to completion by early morning of 30 September. The rest of the day was spent sampling the line and the exclusion zone last fished in April 1993, with the Day grab and benthos dredge. The cameras were retrieved in the evening.

On 1 October, the last grab and benthos dredge samples were collected from the four intersections of the fished lines, areas where the most intense (x 30 and x 40) trawling activity had occurred. With the main experiment completed, attention was directed to the effect of tow duration on survival of the by-catch. Several short tows of 15 min. were made with the codend covered with a small-mesh to determine the survivability of small animals which normally pass through the net. Broodstock sole were collected for later return to Conwy. Longer tows of 0.5 h and 1 h duration were made to observe survival of animals from the codend.

Later in the evening two stills cameras fixed to weighted frames and baited with dragonets were deployed on the fished line for 24 h and the video camera baited with plaice, dabs and dragonet for 3 h.

On 2 October, 1 h and 2 h tows with the 4 m beam trawl were made to determine initial mortality of some epibenthic species. With a forecast of worsening weather, Mr Beard, Mr Edwards and Ms Ramsey (with live animals for experimental studies) disembarked via searider at Amlwch a day earlier than planned. The stills cameras were also retrieved early, after 18 h deployment. In the afternoon and evening, some of the fished and unfished lines of the experimental grid were resampled with 18 replicate tows of the 3 m beam trawl to determine the rate of early recolonisation by mobile epibenthic species.

With the major and subsidiary aims of the programme completed, and with northerly winds forecast for the next day preventing deployment of cameras, CORYSTES set sail at 2000 h on the 2 October and docked at Lowestoft on the morning tide of 5 October.

RESULTS

1. *Sextant* survey software continued to provide accurate position lines and sampling points. Preliminary trials with an acoustic positioning and tracking system (Nautronix ATS-504)

were encouraging and will be continued in shallow water during the next cruise (CORYSTES 12/94).

2. All the four lines were beam trawled to the required intensity and sampled with the Day grab and benthos dredge and occasionally with the 3 m beam trawl.

3. Survival of animals that passed through the codend into the cover net during 15 min. tows was high, with ca. 75% of dragonets and small sole and nearly 100% of the small spider crabs, surviving >36 h. The survival rates of animals retained within the codend was similar to previous results with 100% of dragonets and 80% of sole dying, and >90% of the invertebrates such as hermit crabs and sea mice surviving.

4. Two stills cameras baited with dragonets were twice deployed overnight on the fished and unfished tracks overnight. One of the four deployments may have failed due to flood light failure. The video camera, deployed successfully for several hours at night on two occasions, produced some good records of the early arrival of scavengers at the bait. Small spider crabs (*Inarchus dorsettensis*) were very abundant, feeding on the bait within 10 minutes or so, and hermit crabs within several hours of deployment. Initial observations indicate that as predator density increases at the bait bag, aggressive interactions become more frequent, and interfered with feeding.

5. A preliminary assessment of sampling with the 3 m beam trawl suggests that the composition of some of the main epibenthic predators alters after fishing with the 4 m beam trawl (Table 1). Starfish numbers were reduced initially, whereas numbers of the more mobile predators such as hermit crabs were greatly increased within a few hours of fishing. However, this increase was delayed for several days on the more intensely fished (20 EW) line. The density of most species remained relatively constant on the control line, although there was a significant increase in one species of hermit crab after 120 h.

B E Spencer, SIC
5 October 1994

SEEN IN DRAFT:

B A Chapman, Master
M Reeder, Senior Fishing Mate

INITIALLED: JEP

DISTRIBUTION:

Basic list +
B E Spencer
I Laing
T Beard
M J Kaiser
D B Edwards
R P Flatt
K Ramsey
P Diamond, NWNW SFC

PREDATOR MOVEMENTS IN RESPONSE TO BEAM TRAWL DISTURBANCE

Species composition before and after fishing on the 10 and 20 EW lines of the experimental grid. Mean values of 6 replicate 3.5 min 3 m beam trawl tows.

Date: September 1994

mean number or weight* (kg) per tow ±SE

Species		before (-24 h)	4 m beam trawling	after (+24 h)	after (+120 h)
10 EW					
Asterias rubens		40±5		20±2.9	21±5.1
Ophiura ophiura		21±2.9		24±6.4	13±6.1
Psammechinus miliaris	*	1.7±0.2		1.8±0.5	2.1±0.7
Eupagurus bernhardus		29±4.3		87±18	29±11.6
Eupagurus prideauxi		30±4.5		74±20	28±5.1
Hydroids	*	0.2±0.1		0.05±0.3	0.15±0.04
Alcyonium digitatum	*	5.2±0.4		2.5±0.8	3.67±0.7
20 EW					
Asterias rubens		27±8		11±4	17±3.8
Ophiura ophiura		5.2±1.4		2.5±1	4±1.3
Psammechinus miliaris	*	0.9±0.23		0.6±0.12	0.9±0.21
Eupagurus bernhardus		14±2.5		14±4	37±11
Eupagurus prideauxi		25±4		26±14	30±8
Hydroids	*	0.17±0.05		0.07±0.03	0.2±0.1
Alcyonium digitatum	*	1.05±0.35		0.76±0.2	1.3±0.3
Control area					
Asterias rubens				21±4.8	25±5.4
Ophiura ophiura				14±4.9	19±4.9
Psammechinus miliaris	*			1.7±0.3	1.8±0.3
Eupagurus bernhardus				10±3.2	15±1.8
Eupagurus prideauxi				12±3.3	28±1.9
Hydroids	*			0.18±0.04	0.3±0.1
Alcyonium digitatum	*			2.0±0.34	1.8±0.3