

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

1996 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 5/96

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DURATION: 3-17 April 1996

LOCALITY: Irish Sea

AIMS:

1. To survey the seabed and sample benthos at the experimental site off Anglesey (ref. 53.25.5N; 04.01.5W) at the conclusion of the programme designed to measure the environmental impact of beam trawling on the biodiversity and abundance of benthic animal communities. This site has been fished intensively with a beam-trawl fitted with chain mat during the period April 1993 until October 1994.
2. To film scavenging animals attracted to baited camera frames/and/or a frame-mounted video camera on the seabed using various components of the by-catch as a measure of the response of non-target species to damaged or discarded fish and invertebrates from trawl catches.
3. To quantify, by sampling with a 3-m beam trawl and/or a towed stills camera sledge, the number of macro-epibenthic animals moving onto trawled tracks and control areas as a measure of the response of scavenging species to damaged or discarded fish and invertebrates from trawl catches.
4. To estimate with baited traps, the abundance of scavenging amphipods to determine the importance of their role in scavenging discarded fish and invertebrates from trawl catches.
5. To estimate community structure of benthic invertebrates at sites off Isle of Man, fished at different levels of intensity.
6. To estimate damage rates to selected invertebrate species on scallop grounds fished at different levels of intensity. Fishing intensity to be determined with side-scan sonar surveys.
7. To estimate the spatial distribution of discarded fish and crabs once they reach the seabed, using towed video surveys.
8. To collect live invertebrate scavenger species for experimental feeding and behavioural studies at Conwy as part of our EC collaborative programme to measure how fishing activities may change biodiversity and abundance of the benthic invertebrate communities of the North Sea and Irish Sea.

NARRATIVE:

With the exception of Dr Kaiser and Ms Ramsay, the scientific staff joined the ship at Lowestoft on 3 April. CORYSTES sailed at 0900 h that morning, arriving off Anglesey at noon on the 5 April. Dr Kaiser and Ms Ramsay were picked up from Amlwch by searider and work started at the experimental site that afternoon. Epifauna sampling of three experimental lines with 18 replicate 3.5 minute tows with the 3 m beam trawl was completed. The biomass and abundance of invertebrates on the line fished with a 4 m commercial trawl 6 months previously and both control lines were very similar, suggesting that recovery had occurred within 6 months.

On 6 April, infauna sampling of the experimental grid with the Day grab was begun. Samples were taken from four lines last fished in October 1994, and adjacent control areas. Fine weather enabled completion of 92 of the 112 samples required. At the midday slack water period, two camera frames baited with either dabs or dragonets were deployed for 72 h, and a string of 10 pots adapted for catching amphipods was deployed for 24 h.

On 7 April, the remaining Day grab samples were collected and a start made on further infauna sampling with the benthos dredge. The amphipod pots were retrieved and re-deployed. The modified smaller entrances worked well with a range of small-sized scavengers caught (eg small whelks, amphipods, *Tmetonyx similis*, and isopods, *Cirolana* sp.). The rebaited pots also contained caged live predator species (starfish and hermit crabs) to measure whether their presence influenced the catch rates of small scavengers.

On 8 April, the remaining benthos dredge samples were taken and the pots hauled and re-deployed. A preliminary check suggested that the presence of caged hermit crabs may deter whelks from entering the pot. In the evening, deployment of the video sledge failed to gather satisfactory pictures of the seabed due to the fast tide. A further test in shallow water at slack tide produced good pictures.

On 9 April, the video sledge was deployed over two slack water periods to obtain still photographs and video pictures of the epibenthos of fished and unfished areas of the experimental grid. The amphipod pots and camera frames, deployed 24 and 72 h earlier, were collected. The collection of the final Day grab samples signified the final sampling of the Anglesey site which had begun four years earlier when the first impacts were made with the 4 m beam trawl. Before leaving the site, however, replicate samplings with the Day grab at two sites were made to collect specimens of two species of worms to clarify their taxonomy. With the major aims of the programme at Anglesey completed, CORYSTES set sail for Port Erin, Isle of Man that evening.

On 10 April, Dr A Hill (PEML) and the side scan sonar (left there a few days earlier by RV CIROLANA, for collection) were picked up from Port Erin jetty by searider. The work plan for Manx waters required a standard survey of 16 areas known to have different fishing intensities by the commercial scallop fishing fleet, to see whether there was an effect on the epibenthic invertebrate communities. The standard survey comprised echosounder, side scan and video and stills photographs of the ground, and replicate sampling with the 3 m beam trawl. Three areas were surveyed, but in two, which were boulder-strewn and caused damage to the net despite the added protection of a chain matrix beneath it, fewer samples were collected.

On 11 April, the standard surveys were repeated for 4 other areas, of which some were incompletely sampled because of the boulder-strewn nature of the sea bed. Strong winds in the evening brought the work to an early close.

On 12 April, with continuing strong SE winds and a poor weather forecast, it was decided to return to Anglesey to work on the lee side of the island. After A Hill disembarked at Port Erin at mid-day, CORYSTES set sail for Anglesey arriving late evening.

On 13 April, a side scan survey of the four lines finalised the required observations of the experimental grid. Since the new 3 m beam trawl with chain matrix had not been used for sampling prior to this cruise, 6 x 3.5 minute hauls were made for comparison with the standard trawl on a line previously sampled. It was apparent that not only had the catch efficiency increased, but so had the catch of sand and shell. After slack water, the video sledge was deployed with CORYSTES at anchor. A baited pot was tied beneath the camera to gain some information of the behaviour of scavengers in relation to the trap entrance. This operation was repeated after the evening slack water and again the next morning (April 14). With the aims of the programme completed, Mr Laing and Ms Ramsay disembarked at Amlwch after lunch and CORYSTES set sail for Lowestoft, docking at 0900 h on the 17 April.

RESULTS:

1. All four lines at the experimental grid off Anglesey were sampled successfully with the Day grab, benthos dredge and 3 m beam trawl.
2. Stills cameras baited with dragonets or dabs were deployed for up to 3 days at the experimental site off Anglesey. Deployment of the towed video sledge provided some good records of sea bed condition and epibenthos presence. Video film of the behaviour of scavengers in response to the scent of bait from the pot indicated that improvements in trap design could improve catch rates.
4. The baited traps deployed off Anglesey on three occasions, used two types of entrance. Those with a smaller entrance caught amphipods (mainly *Tmetonyx* sp.) and isopods (*Cirolana* sp.) which were preserved for identification in the laboratory. The traps with a larger entrance were designed to study interactions between different scavenger species. The most abundant species in these traps were hermit crabs, *Pagurus bernhardus*, whelks, *Buccinum undatum* and *Colus gracilis*, and starfish, *Asterias rubens*, as well as amphipods and isopods. Although more data is required for robust statistical analysis, it appears that *Buccinum undatum* may avoid traps containing live hermit crabs (Table 1).
5. Bottom type at the Isle of Man sites, varied considerably, with areas of shelly sand and gravel, boulder-strewn sand and bedrock sampled. Side-scan sonar records showed some evidence of fishing, with both beam trawl and scallop dredge marks at most sites. Most of the sites had similar benthic invertebrate communities, dominated by echinoderms, eg *Porania pulvillus* and *Ophiocomina nigra*. The combined information of the side-scan sonar, video, photographic and trawl records, when analysed, should provide a useful insight into communities subjected to heavy commercial scallop fishing.
6. There was no discernible relation between damage rates to starfish at the Isle of Man sites and commercial scallop fishing effort (Table 2). It is likely, however, that the

observed high damage rates (32%) were caused by the large number of rocks in the net and masked any underlying effect due to the fishery.

A comparison of catches of the 3 m beam trawl fitted with 6 tickler chains or chain matrix showed greater efficiency of the latter gear (Table 3). It was apparent, however, that the absence of flip-up gear on the ground rope contributed to the excessive catch of rocks, sand and shell during most deployments of the 3 m beam trawl fitted with the chain matrix. This modification may well contribute significantly to the development of a suitable piece of gear for sampling on boulder-strewn ground.

Aims 3 and 7 were not accomplished due to other priorities of work.

8. Live starfish and hermit crabs were collected for experimental work at Conwy.

B E Spencer
16 April 1996

SEEN IN DRAFT:

M P Asals, Master
W May, Senior Fishing Mate

INITIALLED: J E P.

DISTRIBUTION:

Basic list +
B E Spencer
W J Meadows
I Laing
M J Kaiser
D B Edwards
R P Flatt
K Ramsay
A Hill (Port Erin)
IoM Marine Fisheries Department (Douglas, IoM)
P Dymond, NWNW SFC

Table 1: Average numbers (\pm 95% confidence limits) of selected species caught in pots baited with crushed crab in the presence of caged live hermit crabs or starfish.

Bait	<i>Liocarcinus</i> spp.	<i>Liocarcinus</i> spp.	<i>Liocarcinus</i> spp.	none
Live animals	none	<i>P. bernhardus</i> (hermit crab)	<i>A. rubens</i> (starfish)	none
Species caught				
<i>Pagurus bernhardus</i>	33 \pm 11	10 \pm 18	21 \pm 3	1
<i>Buccinum undatum</i>	18 \pm 7	8 \pm 3	11 \pm 3	0
<i>Colus gracilis</i>	2 \pm 1	1 \pm 2	4 \pm 0	0
<i>Asterias rubens</i>	0	1 \pm 1	2 \pm 3	0

Table 2: Damage rate of starfish (% of population) in relation to scallop fishing effort in Isle of Man waters.

Site	Effort (hrs/annum)	Number of arms			
		5	4	3	2
D	120	92	6	1	1
O	1549	78	18	3.5	0.5
P	1549	85	12	2.5	0.5
C	2846	84	13	1.7	1.3
E	4951	84	10	3	3
A	7919	87	7	4	2

5 = undamaged starfish

2 = starfish with 2 arms intact

Table 3: Comparison of the catch of a 3 m beam trawl fitted with either six tickler chains or a chain matrix. Mean (± 1 SE) number or weight (kg) (**bold text**) of animals caught in 6 x 3.5 minute tows on the same fished line.

	<u>Ticklers</u>	<u>Matrix</u>
<i>Hydroids</i>	0.34 \pm 0.11	0.48 \pm 0.01
<i>Aphrodite aculeata</i>	7.4 \pm 3.7	18.3 \pm 4.9
<i>Pagurus bernhardus</i>	14.3 \pm 10.6	73.8 \pm 8.6
<i>Pagurus prideaux</i>	11.4 \pm 8.1	34.2 \pm 6.5
<i>Hyas areneus</i>	6.8 \pm 3.0	13.2 \pm 4.1
<i>Macropodia spp.</i>	14.1 \pm 5.5	17.5 \pm 4.1
<i>Buccinum undatum</i>	1.6 \pm 1.2	5.8 \pm 1.7
<i>Neptunia antiqua</i>	5.9 \pm 5.4	25.5 \pm 2.7
<i>Colus gracilis</i>	1.4 \pm 1.2	17.0 \pm 4.1
<i>Pecten maximus</i>	1.2 \pm 0.9	3.3 \pm 0.6
<i>Aequipecten opercularis</i>	16.9 \pm 13.3	47.0 \pm 11.3
<i>Asterias rubens</i>	0.74 \pm 0.29	1.14 \pm 0.13
<i>Ophiura ophiura</i>	8.0 \pm 5.0	20.8 \pm 4.1
<i>Ophiura albida</i>	9.9 \pm 11.4	43.0 \pm 18.3
<i>Crossaster papposus</i>	1.4 \pm 0.7	2.3 \pm 0.3
<i>Psammechinus miliaris</i>	1.21 \pm 0.61	3.13 \pm 0.61
<i>Pleuronectes platessa</i>	3.3 \pm 1.3	7.8 \pm 2.3
<i>Limanda limanda</i>	2.3 \pm 1.1	3.0 \pm 0.8