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FRV *Clupea*

4CR90

Cruise 4/90

## REPORT

16-25 April 1990

### Personnel

J Morrison	SSO (in charge)
J Gamble	PSO (16-20 April)
J Main	SSO (16-20, 22-25 April)
C Shand	HSO
P Copland	HSO (16-19 April, living ashore)
F Burns	ASO
I Napier	PhD student (16-20, 22-25 April)
C Munro	Visitor (UMBS Millport) (22-25 April)

### Objectives

1. To carry out egg surveys on Ballantrae Bank and other areas using a "Day" grab, ROV "Sea-pup" and divers to map the extent of egg deposition and to obtain quantitative samples for subsequent analysis.
2. To use a side-scan sonar to provide a structured image of the sea bed in relevant areas of Ballantrae Bank or South Arran.
3. To carry out larval surveys on Ballantrae Bank in an attempt to relate egg numbers, egg mortality rates and larval production.
4. To lift, service and re-deploy a time-lapse camera laid during a previous cruise.
5. To test out a commercial ROV.

### Narrative

Scientific staff joined *Clupea* at Greenock on the afternoon of 16 April and made passage to Campbeltown the same night. Operations were started at Brown Head, Arran the following day and a grab survey established the presence of an area of spawn deposition where a dense herring shoal had been observed on 5 April during the previous *Clupea* cruise. However, poor weather restricted activities later in the day and *Clupea* made for sheltered waters in the lee of Davaar Island, where the divers were able to test some of their equipment. The 18th was spent at Ballantrae where spawning had occurred since the end of the last *Clupea* cruise; grab surveys established the area of spawn deposition to be in much the same general area as in 1989. Diving and camera work was also carried out on this occasion. The 19th was spent at Brown Head where side-scan sonar was deployed to look for areas of gravel ridges and further grab, diving and camera work was carried out. The 21st and 22nd were again spent operating at Ballantrae and on 22 April a "Sprint" ROV was tested out at Brown Head and in other areas to the south of Arran. The 23rd and 24th were spent at Brown Head and Ballantrae Bank respectively with *Clupea* making for Ardrossan on the evening of 24 April at the end of the cruise.

### Results

#### 1.a) Grab and TV surveys

Spawn patches were identified and delineated at both Brown Head and at Ballantrae. The egg layer at Brown Head was estimated to cover an area of approximately 163,000 m<sup>2</sup> with that at Ballantrae covering an area of approximately 291,000 m<sup>2</sup>. Large scale egg mortalities were found to have occurred at both locations. The egg mortality at Brown Head was associated with

a dense algal deposit of the diatom *Skeletonema costatum* which totally covered the egg mass. The egg mortality at Ballantrae, in contrast, was caused by storms, with large holes being torn in the egg mat and lumps of spawn being deposited in the troughs between the gravel megaripples.

#### 1.b) Diving work

Dives were carried out on both spawning sites whenever weather conditions permitted. In total, three days were spent diving on Ballantrae Bank and two at South Arran. Core samples of spawn were taken from both sites as well as close-up and more general photographs. On 18 April the egg mat on Ballantrae Bank formed a comprehensive layer, although there was evidence from patchy layering and some small areas of disruption that wave damage had already occurred. After a storm the previous day, the egg mat was seen to be very broken up on 20 April, particularly in the vicinity of the current meter. Video transects indicated that between 60 and 75% of the egg mat had been removed.

In contrast, the egg mat at South Arran formed a very comprehensive continuous layer throughout the entire patch. It was noticeable, however, that the eggs were covered with a layer of flocculent material which, as mentioned above, seemed to be derived from the deposition of a phytoplankton bloom. Photosynthetic pigment analysis on frozen core samples subsequently confirmed this observation.

Ripple profiles and surface sediment oxygen uptake measurements were made on both sites, the latter indicating very low levels in late April at South Arran.

#### 2. Side-scan sonar

The Marine Laboratory side-scan sonar was used successfully to delineate areas of gravel and maerl megaripples at South Arran. Each area needed to be covered twice, with one set of sonar transects carried out normal to the other to ensure that megaripples of unknown orientation could be identified. All spawn deposition mapped at Brown Head in 1990 occurred within areas identified as containing megaripples on the basis of the sonar information. At Ballantrae, in contrast, not all the spawn deposition occurred within areas of gravel megaripples.

#### 3. Larval surveys

No larval surveys were carried out during this cruise as egg samples taken in grabs at Ballantrae suggested an approximate spawning date as 14 April with a consequent hatching date in early May. Samples of eggs taken at Brown Head showed an almost total absence of live eggs by 23 April.

#### 4. Time-lapse camera

The time-lapse camera was recovered on 20 April and was not deployed again as spawning had already occurred.

#### 5. Commercial ROV trials

Trials with the "Sprint" ROV were carried out at various locations at South Arran on 22 April. This machine proved to be both very powerful and easy to handle. Excellent video was obtained at Brown Head and at a variety of other locations at South Arran.

J A Morrisson  
28 August 1990

Seen in draft: W Smith

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