R1/6

Not to be cited without prior reference to the Marine Laboratory Aberdeen

FRV *Clupea*

Cruise 0700C

REPORT

5-20 May 2000

Ports

Loading:	Fraserburgh
Unloading:	Fraserburgh
Working:	Oban, 6/7 May; Kyle, 10/11 and 11/12 May; Stromness, 13/14 May; Lyness, 14/15 May; Invergordon 16/17 May

Personnel

D Saward	5-20 May (In charge)
C Shand	5-20 May
L Adams	5-20 May
D Walker	5-12 May
D Moore	11-20 May

Fishing Gear

None

Objectives

1. To undertake grab surveys at a proposed artificial reef site off Lismore and at proposed dredged material disposal sites off Islay, to collect seabed sediment samples for physical and chemical analyses at the FRS Marine Laboratory, Aberdeen (FRS ML).

2. To undertake underwater television surveys at the proposed artificial reef site off Lismore and at the proposed dredged material disposal sites off Islay, to identify the predominant benthic epifauna species.

3. To undertake grab surveys at selected dredged material disposal sites in the Sea of Hebrides and the Minch, to collect seabed sediment samples for physical and chemical analyses at FRS ML.

4. To undertake an underwater television survey in the designated mooring area adjacent to the proposed Kishorn Decommissioning and Supply Base, to confirm the levels of surface debris and to identify the predominant benthic epifauna species (to supplement surveys undertaken during FRV *Clupea* Cruise 0100C).

5. To undertake grab surveys at two fish processing waste disposal sites off the Orkney Isles, to collect seabed sediment samples for physical and chemical analyses

at FRS ML. Where appropriate, core samples may be collected to supplement the grab samples, and Eh/pH analyses undertaken on FRV *Clupea*.

6. To undertake underwater television surveys at the Orkney Isles fish processing waste disposal sites, to identify the predominant benthic epifauna species and to confirm whether there is any evidence of an accumulation of shellfish processing waste.

7. To undertake Agassiz trawl surveys at the Orkney Isles fish processing waste disposal sites, to supplement the Agassiz trawl surveys and, if possible, to collect representative species for chemical analysis at FRS ML.

8. To undertake grab surveys at selected dredged material disposal sites around the Orkney Isles, Fair Isle and the Shetland Isles, to collect seabed sediment samples for physical and chemical analyses at FRS ML.

9. To undertake underwater television surveys at selected dredged material disposal sites around the Orkney Isles, Fair Isle and the Shetland Isles, to identify the predominant benthic epifauna species and to confirm the levels of man-made debris.

10. To undertake grab surveys at selected dredged material disposal sites off the north coast of Scotland, and in the Moray and Cromarty Firths, to collect seabed sediment samples for physical and chemical analyses at FRS ML.

11. To undertake underwater television surveys at selected dredged material disposal sites off the north coast of Scotland, and in the Moray and Cromarty Firths, to identify the predominant benthic epifauna species and to confirm the levels of man-made debris. Where appropriate, Agassiz trawls may be undertaken to supplement the underwater television surveys.

Out-turn Days Per Project: 16 days A02n

Narrative

Cruise personnel joined the vessel at Fraserburgh during the afternoon of 5 May, and completed setting up scientific equipment. Following completion of engineering works, the vessel departed Fraserburgh at 1730 hours to proceed to the West Coast. The vessel anchored in Kilchoan Bay at 2230 hours on 6 May, and remained at anchor until 0800 hours on 7 May. The vessel then proceeded to Lismore, to commence the grab and underwater television surveys as outlined in Objectives 1 and 2. Survey operations were suspended at 1915 hours to proceed to Oban. The vessel remained at Oban until 0730 hours on 8 May, and then returned to the Lismore survey area to complete the underwater television investigations. Following completion of the survey programme off Lismore, the vessel proceeded to Colonsay to undertake a grab survey at the Loch Staosnaig dredged material disposal site, as outlined in Objective 3. Following completion of the grab survey, the vessel anchored in Loch Staosnaig, and remained at anchor until 0800 hours on 9 May. The vessel then proceeded to four potential dredged material disposal sites in the Sound of Islay, to undertake the grab and underwater television surveys outlined in Objectives 1 and 2. During the underwater television investigations, the colour video camera failed following sledge impact with a large boulder. The surveys were therefore suspended, pending diagnosis of the fault, and the vessel proceeded to the Port Ellen dredged material disposal site to undertake a grab survey, as outlined in Objective 3. During passage to the survey area, it was confirmed that the underwater television umbilical had been damaged and it would be necessary to obtain a replacement from Aberdeen. The underwater television surveys in the Sound of Islay were

therefore cancelled. Following completion of the grab survey off Port Ellen, the vessel proceeded to a fifth potential dredged material disposal site at the northern end of the Sound of Islay, to complete the grab surveys outlined in Objective 1. Following completion of the amended survey programme off Islay, the vessel returned to an anchorage in Loch Staosnaig, and remained at anchor until 0745 hours on 10 May. The vessel then proceeded to Kyle to collect the replacement underwater television umbilical. Following exchange of the umbilicals, the vessel remained at Kyle until 0800 hours on 11 May, and then proceeded to Loch Kishorn and outer Loch Carron to undertake the underwater television survey outlined in Objective 4. Following completion of the survey programme in Loch Kishorn and outer Loch Carron, the vessel returned to Kyle, to allow D Moore to join the vessel at 1915 hours on 11 May, and to allow D Walker to disembark at 0630 hours on 12 May. The vessel then proceeded to Hoy Sound, anchoring in Cairston Road off Stromness at 2145 hours. The vessel remained at the Cairston Road anchorage until 0800 hours on 13 May, and then proceeded to the Hoy Mouth dredged material disposal site to undertake a grab survey as outlined in Objective 8. Following completion of the grab survey, the vessel proceeded to the Hoy Mouth and Bring Deeps fish processing waste disposal sites, to undertake the grab, underwater television and Agassiz trawl surveys outlined in Objectives 5, 6 and 7. Survey operations at Bring Deeps were suspended at 1715 hours to proceed to Stromness. The vessel remained at Stromness until 1230 hours on 14 May, and then returned to the Bring Deeps fish processing waste disposal site to complete the grab, corer, underwater television and Agassiz trawl surveys outlined in Objectives 5, 6 and 7. Following completion of the survey programme at Bring Deeps, the vessel proceeded to Lyness. The vessel remained at Lyness until 0730 hours on 15 May, and then proceeded to Thurso Bay to undertake grab and underwater television surveys at the Thurso and Scrabster dredged material disposal sites, as outlined in Objectives 10 and 11. Following completion of the survey programme in Thurso Bay, the vessel proceeded to the Gills Bay dredged material disposal site to undertake a grab survey as outlined in Objective 10. Following completion of the grab survey, the vessel proceeded to the Wick dredged material disposal site to undertake grab and underwater television surveys as outlined in Objectives 10 and 11. Following completion of the survey programme off Wick, the vessel anchored in Sinclair's Bay. The vessel remained at anchor until 0730 hours on 16 May, and then proceeded to the Helmsdale, Riff Bank Buoy and Cromarty dredged material disposal sites to undertake grab surveys as outlined in Objective 10. Following completion of the survey programme off the north coast of the Moray Firth, the vessel proceeded to the Evanton dredged material disposal site to undertake grab and underwater television surveys as outlined in Objectives 10 and 11. Following completion of the survey programme off Evanton, the vessel proceeded to Invergordon. The vessel remained at Invergordon until 0800 hours on 17 May, and then proceeded to the Ardersier (Whiteness Sands), Nairn and Burghead dredged material disposal sites to undertake grab and underwater television surveys as outlined in Objectives 10 and 11. Survey operations were suspended at 2030 hours to proceed to an anchorage in Burghead Bay. The vessel remained at anchor until 0800 hours on 18 May, and then returned to the Burghead dredged material disposal site to complete the underwater television survey outlined in Objective 11. Following completion of the survey programme in the inner Moray Firth, the vessel proceeded to the Lossiemouth and Buckie dredged material disposal sites, to undertake grab and underwater television surveys as outlined in Objectives 10 and 11. Following completion of survey operations off Buckie, the vessel proceeded to an anchorage in Banff Bay. The vessel remained at anchor until 0800 hours on 19 May, and then proceeded to the Macduff and Fraserburgh dredged material disposal sites to undertake grab and underwater television surveys as outlined in Objectives 10 and 11. The underwater television survey at the Fraserburgh site had to be cancelled, because of the sea conditions. Following completion of the work programme, the vessel entered Fraserburgh, berthing at 1515 hours on 19 May. Scientific equipment was demobilised during the afternoon and evening of 19 May, and

scientific staff disembarked at 0900 hours on 20 May to return to Aberdeen. Unloading and loading operations were deferred until 23 May.

Results

1. Grab sampling was undertaken at the Lismore artificial reef site, and adjacent control locations; and at five potential dredged material disposal sites in the Sound of Islay. A total of 84 sampling stations were occupied; 118 Day grab deployments undertaken; and 98 seabed sediment samples collected. Sixty-three core sub-samples, and seven scoop sub-samples (where insufficient sediment was collected to obtain a core), were taken from the grabs for particle size analysis; and 70 surface scoop sub-samples were taken for heavy metal analysis. All of the sub-samples were deep frozen for analysis at FRS ML.

2. Towed sledge underwater television investigations were undertaken at the Lismore artificial reef site, and adjacent control locations. A total of 10 transects, all of approximately 30 minutes duration, were completed and the videotape records retained for analysis at FRS ML. A preliminary assessment of the records, undertaken during the survey, indicated a fairly impoverished epifauna, with very few commercially exploited shellfish species in the vicinity of the proposed artificial reef development. The nature of the sea bed and the epifauna also indicated that the area was unlikely to be a productive fishing ground for white-fish species, and there was no evidence of any scallop dredge or trawl scars on the sea bed. Towed sledge underwater television investigations were attempted at two potential dredged material disposal sites in the Sound of Islay, but only one short video record was obtained before the sledge umbilical was damaged. Proposed surveys at all five potential dredged material disposal sites were therefore cancelled.

3. Grab sampling was undertaken at the Loch Staosnaig and Port Ellen dredged material disposal sites. A total of 16 sampling stations were occupied; 16 Day grab deployments undertaken; and 16 seabed sediment samples collected. Sixteen core sub-samples were taken from the grabs for particle size analysis; and 16 surface scoop sub-samples were taken for heavy metal analysis. All of the sub-samples were deep frozen for analysis at FRS ML.

4. Towed sledge underwater television investigations were undertaken in Loch Kishorn and outer Loch Carron. A total of 12 transects, all of approximately 30 minutes duration, were completed and the videotape records retained for analysis at FRS ML. A preliminary assessment of the records, undertaken during the survey, indicated a soft sea bed with numerous squat lobster and *Nephrops* burrows. Moderate numbers of squat lobsters and *Nephrops* were also observed on the sea bed. There was very little man-made debris observed on the sea bed, but there was evidence of trawling activity. (One small trawler was observed fishing in the area during the survey, and may have been responsible for the comparatively superficial trawl door scars).

5. Grab sampling was undertaken at the Hoy Mouth and Bring Deeps fish processing waste disposal sites, and at a control location adjacent to the Bring Deeps site. A total of 23 sampling stations were occupied; 53 Day grab deployments undertaken; and 31 seabed sediment samples collected. Fourteen core sub-samples, and two scoop sub-samples (where insufficient sediment was collected to obtain a core), were taken from the grabs for particle size analysis; and 16 surface scoop sub-samples were taken for heavy metal analysis. All of the sub-samples were deep frozen for analysis at FRS ML. Supplementary core sampling was attempted at the centre of the

Bring Deeps fish processing waste disposal site, and at the adjacent control location. Two sampling stations were occupied and six Craib corer deployments undertaken, but it was not possible to obtain any samples because of the shell and maerl debris overlying the softer sand. Supplementary core sampling was not attempted at the Hoy Mouth fish processing waste disposal site.

6. Towed sledge underwater television investigations were undertaken at the Hoy Mouth and Bring Deeps fish processing waste disposal sites, and at a control location adjacent to the Bring Deeps site. A total of seven transects, all of approximately 30 minutes duration, were completed and the videotape records retained for analysis at FRS ML. A preliminary assessment of the Hoy Mouth records, undertaken during the survey, indicated a very hard sea bed, consisting of either small stones and cobbles overlying shell gravel, or exposed bedrock. The stoney areas supported very little epifauna (mainly starfish). Some areas of the bedrock were totally devoid of epifauna, but most areas were almost totally covered with *Alcyonium* and large numbers of sea urchins. A preliminary assessment of the Bring Deeps and control location records indicated a sandy seabed, with varying amounts of dead bivalve shells, shell debris, maerl debris and small stones. At both the disposal site and the control location, the sea bed supported a range of epifauna, including starfish, sea urchins, crabs, squat lobsters, queenies and some live horse mussels. Shellfish processing waste was not observed during the investigations at the Hoy Mouth site; and the vast majority of the dead bivalve shells observed during the investigations at the Bring Deeps site and adjacent control location appeared to be of natural origin.

7. Agassiz trawl investigations were undertaken at the Hoy Mouth and Bring Deeps fish processing waste disposal sites, and at a control location adjacent to the Bring Deeps site. A total of six Agassiz trawl tows, all of 10 minutes duration, were completed; and the benthic epifauna present in the trawls were identified and enumerated on FRV *Clupea*. Two trawls were completed at the Hoy Mouth site, and the net was damaged during both trawls. Very little material was retained in the trawls, apart from kelp debris, a few starfish, a brittle star and ascidians; and the survey was abandoned. Three trawls were completed at the Bring Deeps site, and one at the adjacent control location. At both the disposal site and the control location, the predominant epifauna species were starfish, sea urchins, crabs and queenies, and the trawls contained large quantities of broken bivalve shells and kelp debris. Shellfish processing waste was not recovered in either of the trawls undertaken at the Hoy Mouth site; and most of the shell debris recovered in the trawls undertaken at the Bring Deeps site and adjacent control location appeared to be of natural origin (predominantly horse mussel and razor shell debris). There was insufficient material in the trawls to obtain samples of representative species for chemical analysis at FRS ML.

8. Grab sampling was undertaken at the Stromness A and B dredged material disposal sites. A total of 18 sampling stations were occupied; 27 Day grab deployments undertaken; and 23 seabed sediment samples collected. Sixteen core sub-samples, and one scoop sub-sample (where insufficient sediment was collected to obtain a core), were taken from the grabs for particle size analysis; and 17 surface scoop sub-samples were taken for heavy metal analysis. All of the sub-samples were deep frozen for analysis at FRS ML. Grab sampling at the Scalloway, Punds Voe, Foula and North Haven (Fair Isle) dredged material disposal sites was cancelled, to concentrate on completing the sampling programmes off the north coast of Scotland, and in the Moray and Cromarty Firths.

10. Grab sampling was undertaken at the Scrabster, Thurso, Gills Bay, Wick, Helmsdale, Riff Bank Buoy, Cromarty, Evanton, Ardersier (Whiteness Sands), Nairn, Burghead, Lossiemouth, Buckie, Macduff and Fraserburgh dredged material disposal sites. A total of 93 sampling stations were occupied; 198 Day grab deployments undertaken; and 160 seabed sediment samples collected. Fifty-seven core sub-samples, and 13 scoop sub-samples (where insufficient sediment was collected to obtain a core) were taken from the grabs for particle size analysis; and 70 surface scoop sub-samples were taken for heavy metal analysis. All of the sub-samples were deep frozen for analysis at FRS ML. Lumps of consolidated material, which did not appear to be typical of the area, were recovered during grab deployments at the Evanton, Nairn, Burghead, Lossiemouth and Macduff sites, which may have been related to dredged material disposal operations. Concrete debris (colonised by *Alcyonium* spp.) was recovered during one of the grab deployments at the Helmsdale site, which again may have been related to dredged material disposal operations.

11. Towed sledge underwater television investigations were undertaken at the Scrabster, Thurso, Wick, Evanton, Whiteness Sands, Nairn, Burghead, Lossiemouth, Buckie and Macduff dredged material disposal sites. A total of 23 transects, all of approximately 30 minutes duration, were completed and the videotape records retained for analysis at FRS ML. A preliminary assessment of the records, undertaken during the surveys, indicated that domestic litter was present on the sea bed at the Scrabster, Thurso, Ardersier, Buckie and Macduff sites, but the quantities were trivial. More substantial man-made debris, such as wires or ropes, tyres, pipework, metal objects and masonry, were observed on the sea bed at the Scrabster, Burghead, Buckie and Macduff sites, which could have been related to dredged material disposal operations. However, the wires or ropes and tyres could also have been related to the activities of fishing vessels working in those areas. Supplementary Agassiz trawl investigations were undertaken at the Whiteness Sands dredged material disposal site, because it was not possible to deploy the underwater television sledge in the shallower waters immediately adjacent to the offshore boundary of the disposal site. Two Agassiz trawl tows, each of approximately 15 minutes duration, were completed, and the benthic epifauna present in the trawls were identified and enumerated on FRV *Clupea*. Domestic litter was recovered in one of the trawls, but again the quantity was trivial. Underwater television investigations at the Fraserburgh dredged material disposal site had to be cancelled, because of the sea conditions.

D Saward
20 May 2000

Seen in draft: A Simpson, OIC

Cruise 0700C - Survey Areas