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FRV *Clupea*

Cruise 0507C

REPORT

4-21April 2006

Personnel

*J Mckie	12–24 April (In charge 12-24 April)
P Hayes	04–12 and 18 -24 April (In charge 4–12 April)
D Moore	12–18 April
G Rodger	18–24 April
C Shand	04-24 April
P Stainer	04-18 April
M McCann	18-24 April
C Matthews	MSc Student 04-12 April
C Greathead	12-16 April

Objectives

1. To collect biota samples for TBT analysis using whelk pots at the Peterhead dredged material disposal site.

2. To undertake underwater television (UWT), grab and RoxAnn surveys at the Peterhead dredged material disposal site to assess the condition of the sea bed identify the predominant benthic epifauna species, and the distribution of man-made debris.

3. To undertake Agassiz, UWT, grab and RoxAnn surveys at two potential sea disposal sites off Whitehills.

4. To undertake Agassiz, grab RoxAnn and UWT surveys at potential Aberdeen offshore windfarm site.

5. To undertake sediment sampling and where possible UWT surveys off Invergordon and at the Sutors sea disposal site.

6. To undertake Agassiz, grab RoxAnn and UWT surveys at dredged material disposal sites around Orkney, a maximum of five sites to be investigated.

7. To undertake grab, RoxAnn and UWT surveys at EMEC renewables test centre off Orkney (two sites).

Out-turn days per project: AE02n (10108) – 20 days

Narrative

Departure from Fraserburgh Harbour on the 4 April was delayed by 24 hours due to poor weather. The following morning passage was made to Peterhead disposal site. On arrival at the disposal site, three UWT transects were successfully completed. The deployment of the Agassiz trawl failed due to stoney ground in and around the disposal site. Ten buckie pots were deployed. Buckie pots were located to the north, within and to the south of the disposal. The local SFPA Office and the Peterhead Port Authority were notified of their deployment for a maximum period of 24 hours and their perimeter coordinates. Six grab sediment sample stations were attempted before passage was made for Peterhead Harbour. The following morning a Sholkowitz core was successfully deployed while berthed at Peterhead Harbour. After requesting access from the harbourmaster, a second attempt was made within the entrance basin of the harbour. Four grab samples were attempted from within Peterhead Bay before returning to the disposal site to attempt an additional 15 grab sample stations. The Buckie pots were recovered with the loss of one pot during the recovery operation. Passage was made to an anchorage in Balmedie Bay. The following morning three UWT transects and three agassiz trawls were successfully completed north of the Don estuary. Fifteen grab samples were also attempted before returning to Fraserburgh Harbour to collect and install an integral component of the *Clupea*'s starboard generator. After the successful repairs to the generator, overnight passage was made to an anchorage point at Navity Bank south of the entrance to the Cromarty Firth. This decision was made to avoid the in coming north-westerly weather, which would have hindered the proposed work along the south Moray coast. The next day, after lunch, thirty-eight grab samples were attempted between the oilrig anchorage points four and eight in the Cromarty Firth. On completion of the grab samples, the *Clupea* made for Invergordon Harbour. The following morning and early afternoon were spent collecting three UWT transects and three agassiz trawls across the grab survey area. During the remainder of the afternoon and early evening an additional twelve grab stations were attempted at the Guillam Bank disposal site to complete a grab survey started in 2004. Anchorage was found in the southeast of Cromarty Firth close to the Sutors sea disposal site. Seventeen grab stations were attempted and two TV tows over the Sutors disposal site were completed the following day. The Chief Engineer was concerned about the accumulation of water in the oil for lubricating the prop. This was most apparent when *Clupea* was travelling at speed. The Captain, Chief Engineer and Scientist in charge agreed that the ingress of water via the prop would be monitored for two hours while travelling at speed. During this time, no noticeable ingress of water was observed however, as a precautionary measure additional oil would be delivered to Inverness Harbour. Passage was made to anchorage in Middle Bank to catch the tide for the following day, enabling entrance into Beauly Basin and access to Inverness Harbour. The following morning nine grab stations were attempted and two UWT transects completed across the Inverness sea disposal site. On completion of the survey work, *Clupea* berthed at Inverness Harbour awaiting the arrival of additional oil and in readiness to exchange staff the following morning. After lunch on the following day (12th April), passage was made for anchorage at Sinclair Bay. The next morning passage was made to the Orkney sea disposal site north of Stronsay where five grab samples were attempted and one UWT transect completed. Overnight was spent at anchorage in the Bay of Holland. The following day passage was made to the Falls of Warness to complete UWT transects along the western margin of the EMEC tidal energy test facility. Timing for the deployment of the UWT was restricted to slack water due to

the exceptional tidal currents. However, two excellent WT transects were completed before making passage to the Kirkwall sea disposal site. Five grab samples were attempted at the Kirkwall disposal site and one UWT transect completed. Tidal conditions at the disposal site made the deployment of the UWT very difficult resulting in a number of aborted attempts. Overnight was spent in Kirkwall Harbour. The following morning passage was made to Stromness Harbour. On route, the UWT was trialled to ensure that the problems encountered during deployment on the previous day were a function of the tidal conditions and not the result of problems with the equipment. The faultless deployment concurred with our suspicions. Also on route, Stromness B sea disposal site was surveyed with five attempts using the day grab and two completed UTW transects. The following day was taken as a rest day and one of the scientific crew disembarked back to the mainland on the Stromness to Scrabster ferry. Passage to Invergordon was made the following day via Wick sea disposal site where five day grab samples were attempted. Immediately after lunch on 18th April, three scientific staff joined the *Clupea* and two scientific staff disembarked. Passage was made to Macduff however, the ingress of water resulted in the *Clupea* returning to Fraserburgh and the scientific crew disembarking. The scientific crew rejoined the *Clupea* on 20th April however, the ingress of water via the prop became more serious and the remainder of the cruise was abandoned.

Results

The cruise although achieving many of its objectives was hindered by poor weather, tidal restrictions and conditions for certain sites and recurring problems with the *Clupea* that ultimately lead to the premature termination of the cruise. No RoxAnn surveys were completed at any of the site since the equipment was not loaded onto the *Clupea*.

a. At Peterhead sea disposal site eleven grab samples were recovered from twenty-four stations and will be analysed for tributyl tin (TBT). Ten buckie pots were deployed on and away from the sea disposal site to collect Buccinum undatum. Imposex measurements will be made on the Buccinum undatum to assess their exposure to TBT derived from the disposal of dredged material. One agassiz traw was attempted at the disposal site but the sea bed proved unsuitable for its use. Three UWT transects across the disposal site showed no evidence of manmade debris. Three additional grab samples were collected from Peterhead Bay to assess the mobilisation of TBT from the confines of the harbour. One sholkovitz core was successfully recovered outside the western entrance wall to the harbour to assess he temporal distribution of TBT in the sediments.

b. In advance of the proposed Aberdeen wind farm project, three UWT transects and three agassiz trawls were completed between the rived Don Estuary and Blackdog Rock. Sea bed morphology was dominated by sand ripples with limited macro benthos. Fifteen grab samples were recovered with some samples showing anoxic conditions a depth.

c. Maintenance of oil rig installations at designated anchorages has occurred within the Cromarty Firth for a number of years. Poor weather conditions resulted in an extended grab survey than previously planned. In total thirty eight grab samples were recovered between anchorage points four and eight. These anchorage sites were chosen as they are the closest sites to Invergordon Harbour resulting in their greater use over the years. Three UWT transects and three agassiz trawls

indicated changes in the sea bed type and morphology along the length of the firth but, no evidence of man made debris was recorded.

d. Twelve grab samples were collected along a transect to the west of Guillam Bank sea disposal site. This completed the initial work undertaken on previous EP cruises to assess the spatial extent of elevated PAH concentrations associated with the disposal site.

e. At the Sutors sea disposal site seventeen grab samples were colleted and two UWT transects completed. The sea bed was dominated by rippled sand with limited macro benthos. There was no evidence of manmade debris.

f. The survey of the Inverness sea disposal site in the Beauly Basin comprised nine grab samples and two UWT transects. The strong tidal conditions ensure a stoney sea bed with large ppulations of limited macro benthos not of a sensitive or protected nature.

g. The failed grab sampling at the Orkney sea disposal site north of Stronsay suggested the sea bed was dominated by hard ground. The deployment of the UWT confirmed this and only one transect was attempted. The sea bed was dominated by boulders and exposed bedrock of red sandstone consistent with the terrestrial geology of Orkney. There was no evidence of manmade debris.

h. The EMEC test facility located within the Falls of Warness west of Eday was surveyed in advance of the deployment of test devices. Due to extreme tidal conditions within the Falls of Warness, work could only be attempted at slack water. Two UWT transects were completed indicating large areas of exposed bed rock comprising red sandstone. The geology was characterised by exposed flat areas of sandstone bedding planes with steeper sloping joints. The macro benthos was concentrated on the joint surfaces that offered greater protection from the prevailing tidal currents. No macro benthic species of a sensitive or protected nature were identified.

i. Kirkwall sea disposal site survey comprised five grab samples and one UWT. Tidal conditions at the disposal site restricted additional UWT transects. The sea bed was dominated by sand with no evidence of manmade debris.

j. At Stromness B sea disposal site five grab samples were collected and two UWT transects completed. The sea bed was predominately sandy with some coarser areas of gravel and small stones. There was no evidence of manmade debris or macro benthos of a sensitive or protected nature.

k. The survey work proposed for the Stromness A and C sea disposal sites and he EMEC test facility at Billia Croo were abandoned due to poor weather.

l. Wick sea disposal site was surveyed en route to Invergordon Harbour with the collection of five grabs showing sand with small stones and shell material. The weather conditions were unsuitable for the deployment of the underwater towed sledge.

m. Only a partial survey of Burghead sea disposal site was completed due to ongoing problems with the *Clupea* which lead to the eventual abandonment of the cruise.

All data collected from the sea disposal sites will be used to assess the continuing use of the sites. The information generated from the surveys of sites proposed for offshore renewable energy activities will form the basis for future monitoring work to assess the potential impacts of these activities on the marine environment.

The crew, and in particular the ships Captain, provided excellent support throughout the cruise especially when working at sites with challenging tidal conditions.

Peter Hayes
14 April 2008