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FRV *Scotia*

Cruise 0111S

## **PROGRAMME**

6-21 January 2011

**Loading:** Leith / Aberdeen

**Unloading:** Aberdeen

In setting the cruise programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's Working Time Policy (Lab Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the cruise with staff on-board before work is commenced.

In the interest of efficient data management it is now mandatory to return the Cruise Report, to I Gibb and the Cruise Summary Report (old ROSCOP form) to M Geldart, within four weeks of a cruise ending. In the case of the Cruise Summary Report a nil return is required, if appropriate.

## **Personnel**

M Russell (SIC)  
A McIntosh  
M McKenzie  
E Dalgarno  
G Packer  
P Stainer  
G Grewar\*  
I Hussy\*  
D Avery\*\*  
N Aldridge\*\*

\* will join in Aberdeen on 6 January for first part of cruise.

\*\* will join for second part of cruise, time and place for small boat transfer will be work and weather dependent.

**Fishing gear:** BT 101 with tickler chains; **Sediment Sampling:** Day grab and sieves; **Litter sampling:** bongo and neuston nets.

## **Objectives**

1. To undertake water, sediment and biological sampling for the Clean Seas Environmental Monitoring Programme (CSEMP).

2. To collect water samples for nutrient studies as part of the Scottish Coastal Eutrophication Assessment Survey (SCEAS).
3. Undertake CSEMP sediment sampling in the Firth of Forth for SEPA.
4. Undertake WFD biological sampling at 3 sites in and near the Forth and WFD sediment sampling off Lerwick for SEPA.
5. Undertake additional sampling for integrated assessment ROAME.
6. Monitor and record all litter brought aboard in all trawls. Sample water column and sediment for microplastic litter.

**Estimated Days Per Project:** 13 days AE11p/AE11s, 1 day AE11t , 2 days AE11101.

## **Procedure**

At the 4 CSEMP fixed sites (NMMP85, NMMP95, NMMP105, NMMP165) water, sediment (for chemistry only) and fish will be sampled.

Stratified random samples of sediment will be taken from one stratum on the East coast, four strata in the Fladen Ground, two strata in the Moray Firth, two strata in the North Minch and one stratum in the Sea of Hebrides (Table 1; Figure 1). Fish sampling will be carried out within these strata, except for the Sea of Hebrides (Table 1).

Water and sediments will be sampled for chemical analyses at all locations. Sediment will be sieved for macrobenthos analysis only at the stratified random sampling locations. Fish will be sampled for biological effects measurements and chemical analyses. Some biological effects measurements will be carried out during the cruise. Nutrient samples will be collected and appropriately stored throughout the cruise.

Additional sampling will be carried out at 5 sites in the Firth of Forth, in support of CSEMP sampling for SEPA (Table 2). Five sites off Lerwick will be sampled for SEPA, for benthos only (Table 2). Three sites will be sampled for phytoplankton/nutrients and chlorophyll in support of WFD for SEPA.

Surface water will be collected for hydrographic nutrient studies (SCEAS) from coastal regions around the east and west coast mainland and around Orkney and Shetland at fixed time intervals. Completion of this objective will be time and weather dependent.

In support of the Integrated Assessment ROAME both plaice and dab will be sampled, if present, in the Moray Firth (both strata), Shetland and the Fladen Ground.

Monitoring of all litter brought on board during trawling operations will continue throughout the cruise. Testing of the sampling equipment for microplastics in the water column will be carried out at one site in the Forth. Further sites will be sampled – these will be within the CSEMP cruise track and will be defined in advance. Sediment samples will also be taken at all sites sampled for microplastics in the water column.

Weather and time permitting extra sediment will be collected to provide a chemistry laboratory reference material.

### **General Arrangements**

Liquid nitrogen and formaldehyde will be carried aboard for the preservation and storage of biological material.

Normal contacts will be maintained with the laboratory.

Submitted:  
*M Russell*  
8 December 2010

Approved:  
*I Gibb*  
9 December 2010

**Table 1**

## CSEMP Sampling

<b>CSEMP Site</b>	<b>Water samples</b> (nutrients TOxN, phosphate, silicate, nitrite and ammonia analyses)	<b>Sediment Chemistry</b> (PAH, CB, BFR, trace metals, PSA, TOC)	<b>Macrobenthos (1mm sieved fraction)</b>	<b>Fish Chemistry</b> Chemistry (PAH, CB, BFR, trace metals) and biological effects (EROD and PAH bile metabolites)
Continuous water sampling in support of SCEAS				
East Coast stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	5 samples	5 samples	-
NMMP 165 (Montrose Bank) 56°30.00'N 001°30.00'W	1 x 5 m from surface, 1 x 5 m from bottom	1 sample	-	5 pools of 5 plaice# 56°30.00'N 001°30.00'W
Fladen ground stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	3 samples from each of 4 strata	3 samples from each of 4 strata	5 pools of 5 fish# Approx fish site position 59 12.00'N 001°27.00'W
Moray Firth stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	5 samples from stratum 1, 10 from stratum 2	5 samples from stratum 1, 10 from stratum 2	-
NMMP 95 (Intermediate Moray Firth) 57°40.00'N 003°49.00'W	1 x 5 m from surface, 1 x 5 m from bottom	1 sample	-	5 pools of 5 plaice# Fishing site 57°53.00'N 003°39.48'W
NMMP 105 (Outer Moray Firth) 58°03.00'N 003°00.00'W	1 x 5 m from surface, 1 x 5 m from bottom	1 sample	-	5 pools of 5 fish# Fishing site 58°03.00'N 003°00.00'W
North Minch stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	5 samples from each of 2 strata	5 samples from each of 2 strata	5 pools of 5 plaice from stratum 2 only
NMMP 85 (North Minch ) 58°00.00'N 005°40.00'W	1 x 5 m from surface, 1 x 5 m from bottom	1 sample	-	5 pools of 5 plaice Fishing site 58°23.00'N 005°58.00'W
Sea of Hebrides stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	10 samples	10 samples	
Shetland east coast stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	5 samples	5 samples	-
Shetland west coast stratified random	1 site per stratum: 1 x 5 m from surface, 1 x 5 m from bottom	5 samples	5 samples	-
Shetland northeast coast				5 pools of 5 plaice#

# Extra fish sampling for dab at these sites for the integrated assessment ROAME.

**Table 2**

Sampling for SEPA

<b>Shetland Offshore (on behalf of SEPA)</b>		
<b>WFD Site</b>	<b>Benthos PSA</b>	<b>Macrobenthos (1mm sieved fraction)</b>
Hawk's Ness	1 sample, PS only	1 sample
Lerwick UWWTD Site F	1 sample, PS only	1 sample
Lerwick Benthic sample site 2	1 sample, PS only	1 sample
Lerwick Benthic sample site 17	1 sample, PS only	1 sample
Lerwick UWWTD Site F	1 sample	1 sample
<b>Firth of Forth on behalf of SEPA</b>		
<b>CSEMP Site</b>	<b>Sediment Chemistry (organics, metals, TOC and PS)</b>	<b>Macrobenthos (1mm sieved fraction)</b>
Firth of Forth at Fairway Buoy	1 sample	1 sample
Firth of Forth Spatial Survey Station 49	1 sample	1 sample
Firth of Forth Spatial Survey Station 42	1 sample	1 sample
Firth of Forth Spatial Survey Station 38	1 sample	1 sample
Firth of Forth Spatial Survey Station 33	1 sample	1 sample

**Table 3**

Additional WFD sampling on behalf of SEPA

Sampling Programme Summary			Biological samples			Supporting determinands and samples			
Site Name	Latitude	Longitude	Plankton Lund Tube	Plankton Lund Tube	Plankton (63µm) Vertical Haul	Salinity & temperature 1, 5 & 10m	Nutrients 1, 5 & 10m and from Lund tube	Chlorophyll 1, 5, 10m depth	Lund Tube Chlorophyll sample
			250ml brown glass bottle	30ml sterilin tube	30ml sterilin tube				
			Lugol's Iodine	Lugol's Iodine	Formalin			chl filtrand: freeze	chl filtrand : freeze
CSP13 COASTAL SURVEY MAY ISLE SOUTH FIRTH OF FORTH AT FAIRWAY BUOY ST ANDREWS BAY PLANKTON STATION 21 (SABP021)	N 56 9.99	W 2 35.09	sample	sample	sample	Yes	data	data	data
	N 56 2.9983	W 3 0.0873	sample	sample	sample	Yes	data	data	data
	N 56 27.2924	W 2 39.6917	sample	sample	sample	Yes	data	data	data

**Figure 1:** Principle sampling areas and locations for 0111s.

