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MRV *Scotia*

Survey 0115S

PROGRAMME

5 – 20 January 2015

Loading: Aberdeen, 22 December 2014
Sailing: Leith, 5 January 2015*
Unloading: Aberdeen, 20 January 2015
*Scientific crew will join at Leith on the morning of 5 January

***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 MSS' Working Time Policy (Lab Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.**

In the interest of efficient data management it is now mandatory to return the Survey Report and the Survey Summary Report within four weeks of a survey ending. In the case of the Survey Summary Report a nil return is required if appropriate.

Personnel
M. Russell (SIC)
T. Betts
E. Dalgarno
K. MacNeish
G. Packer
C. Robinson
N. Shepherd
A N Other (MSS)

Fishing gear: BT 101 with tickler chains, also rockhopper groundgear for Rockall; **Sediment Sampling:** Day grab and sieves; **Litter sampling**: Catamaran neuston trawl

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. Monitor and record all litter brought aboard in all trawls. Sample water column and sediment for micro-plastic litter.
5. Collect seawater samples off Mingulay for Ocean Acidification ROAME
6. Collect and process samples for Candyfloss program

Estimated Days Per Project: 14 days ST03n; ½ day ST012; 1½ days ST014.

Procedure

Surface water will be collected for hydrographic nutrient studies (SCEAS) throughout the survey at fixed time intervals. Nutrient samples will be appropriately stored and

returned to the laboratory for analyses. Water samples will be taken off Mingulay in support of the Ocean Acidification ROAME (Fig 1). Water samples will be collected for the Candyfloss programme once par day and processed onboard.

It is proposed to carry out fish sampling in the Rockall and Bailey areas. Alternative areas are included in the programme if weather precludes sampling. SIC to liaise with the ships master at the start of the survey with updated weather forecast information to prioritise working areas.

Fish sampling will be carried out at the Montrose Bank and North Minch NMMP sites. Fishing will also be carried out in the region of the Western Shelf edge and the Rockall plateau. If weather conditions preclude sampling in these last 2 areas it is proposed to sample in the Forties area of the North Sea. If time allows the Faroes-Shetland Channel could also be sampled.

Sediment sampling will be carried out at the East coast, Inner and Outer Moray Firth, the Minch North, the Minch South and the Sea of Hebrides. Sediment sampling will also be carried out at the four CSEMP fixed sites (NMMP85 – North Minch, NMMP95 – Inner Moray Firth, NMMP105 – Outer Moray Firth, NMMP165 – Montrose Bank). A limited investigation of potential sediment sampling areas will be carried out in the Rockall and Bailey sea areas (weather permitting). Sediment sampling will be carried out in the Faroes-Shetland Channel, Forties and east of Shetland if these areas are visited.

Sediments will be sampled for chemical analyses at all locations. Sediment will be sieved for macrobenthos analysis (1 mm sieve) in the North and South Minches and Sea of Hebrides only (samples for SEPA). Fish will be sampled for biological effects measurements and chemical analyses. Some biological effects measurements will be carried out during the survey.

Additional sediment sampling will be carried out at 5 sites in the Firth of Forth, in support of CSEMP sampling for SEPA (Table 2).

Monitoring of all litter brought on board during trawling operations will continue throughout the survey. The catamaran will be deployed to sample for micro-plastics whenever possible and samples processed onboard as far as possible. Additional sediment samples will also be taken for micro-plastics where possible.

Sediment will be collected to provide a chemistry laboratory reference material. Where possible if sufficient suitable fish not required for other studies are obtained during trawling, livers will be sampled for reference material.

General Arrangements

Liquid nitrogen and formaldehyde will be carried aboard for the preservation and storage of biological material. A full list of chemicals to be carried is attached.

Normal contacts will be maintained with the laboratory.

Submitted:
M. Russell
4 December 2014

Approved:
I. Gibb
8 December 2014

Table 1 Sampling

Station	**Water samples** (nutrients TOxN, phosphate, silicate, nitrite, and ammonia analyses)	**Sediment Chemistry** (PAH, CB, PBDE, trace metals, PSA, TOC)	**Macrobenthos (1mm sieved fraction)**	**Fish Chemistry** Chemistry (CB, PBDE, trace metals) and biological effects (EROD and PAH bile metabolites)
Continuous water sampling in support of SCEAS	Continuous hourly sampling			
Mingulay Site	5 and 20 m and 20 m from bottom			
East Coast		5 samples		
NMMP 165 (Montrose Bank)		1 sample		5 pools of 5 fish (56 30.00N 001 30.00W)
Moray Firth (2 strata)		15 samples		
NMMP 95 (Int. Moray Firth)		1 sample		
NMMP 105 (Outer Moray Firth)		1 sample		
North Minch stratified random		5 samples	5 samples	
South Minch stratified random		5 samples	5 samples	
NMMP 85 (North Minch)		1 sample		5 pools of 5 fish Fishing site (58 23.00N 005 58.00W)
Sea of Hebrides stratified random		10 samples	10 samples	
Bailey (Rosemary Bank)		Possible sites		5 pools of 5 fish, new site, weather permitting
Rockall Plateau		Possible sites		5 pools of 5 fish, new site, weather permitting
Alternative sites if Rockall/Bailey not feasible				
Lerwick		5		
Faroe-Shetland Channel		5		5 pools of 5 fish, new site
Forties		12		5 pools of 5 fish, new site

Table 2 Sampling for SEPA - Firth of Forth.

Firth of Forth (on behalf of SEPA)	
CSEMP Site	**Sediment Chemistry (organics, metals, TOC and PS)**
Firth of Forth at Fairway Buoy	1 sample
Firth of Forth Spatial Survey Station 49	1 sample
Firth of Forth Spatial Survey Station 42	1 sample
Firth of Forth Spatial Survey Station 38	1 sample
Firth of Forth Spatial Survey Station 33	1 sample

Figure 1: 0115S Sampling Areas (alternative sites underlined)

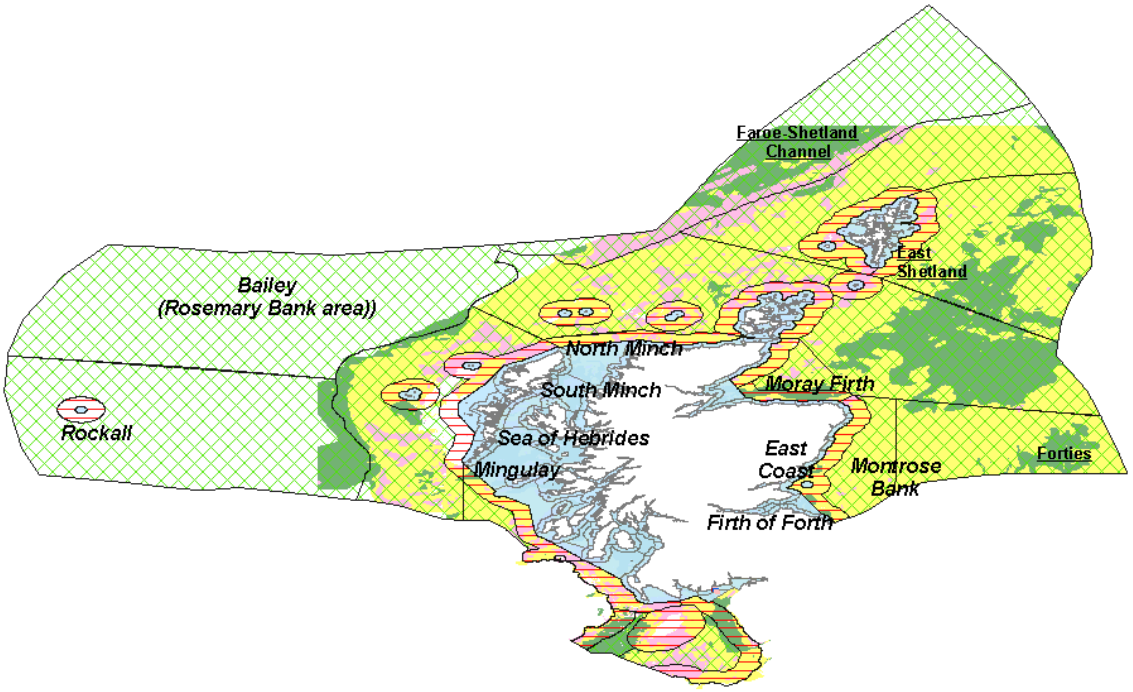

Table 3 Chemicals for survey

Liquid nitrogen
10% Buffered Formalin
48% Ethanol
Hydroxypyrene
Methanol
Heparin
Aprotanin
MS 222
Homogenising buffer (Ethylenediaminetetra-acetic acid (EDTA; disodium salt), Dithiothreitol, 0.2M di-Potassium hydrogen orthophosphate 3-hydrate, 0.2M Potassium di-hydrogen orthophosphate, 0.3M Potassium Chloride)
Dichloromethane
IMS
Formaldehyde
Decon