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MRV *Scotia*

Survey 0114S

PROGRAMME

6 – 21 January 2013

Loading: Aberdeen, 22 December 2013

Sailing: Leith, 6 January 2014*

Unloading: Aberdeen, 21 January 2014

***Scientific crew will join at Leith on 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 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 and the Cruise Summary Report 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)

T Betts

E Dalgarno

K MacNeish

G Packer

C Robinson

P Stainer

N Shepherd

A Taylor

Fishing gear: BT 101 with tickler chains; **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 WFD/CSEMP sediment sampling at Lerwick and Firth of Forth for SEPA.
4. Monitor and record all litter brought aboard in all trawls. Sample water column and sediment for microplastic litter.
5. Collect seawater samples off Mingulay for Ocean Acidification ROAME

Estimated Days Per Project: 13 days ST03n; half day day STO12; 2 days ST014.

Procedure

Surface water will be collected for hydrographic nutrient studies (SCEAS) throughout the cruise at fixed time intervals. Nutrient samples will be analysed at sea where possible, otherwise 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)

Stratified random samples of sediment will be taken from one stratum on the East coast, four strata in the East Shetland Basin, two strata in the Moray Firth, two strata in the North Minch, one stratum in the Sea of Hebrides and one stratum to the west of the Hebrides. Sediment for chemical analyses will be taken at the four CSEMP fixed sites (NMMP85 – North Minch, NMMP95 – Inner Moray Firth, NMMP105 – Outer Moray Firth, NMMP165 – Montrose Bank).

Fish sampling will be carried out in the East Shetland Basin, East Shetland, West Shetland, west of Hebrides, Montrose Bank and the Outer Moray Firth. East Shetland Basin, West Shetland and west of Hebrides are proposed new sites for this survey.

Sediments will be sampled for chemical analyses at all locations. Sediment will be sieved for macrobenthos analysis (1 mm sieve) only at East Scotland, East Shetland Basin and west of Hebrides. Fish will be sampled for biological effects measurements and chemical analyses. Some biological effects measurements will be carried out during the cruise.

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

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 in each of the sampling areas. Trials of towing the catamaran/neuston net at speeds of up to 8 knots will be carried out during traverses between areas. Additional 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. Where possible if sufficient suitable fish not required for other studies are obtained during trawling livers will be sampled for a 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
16 December 2013

Approved:
I Gibb
17 December 2013.

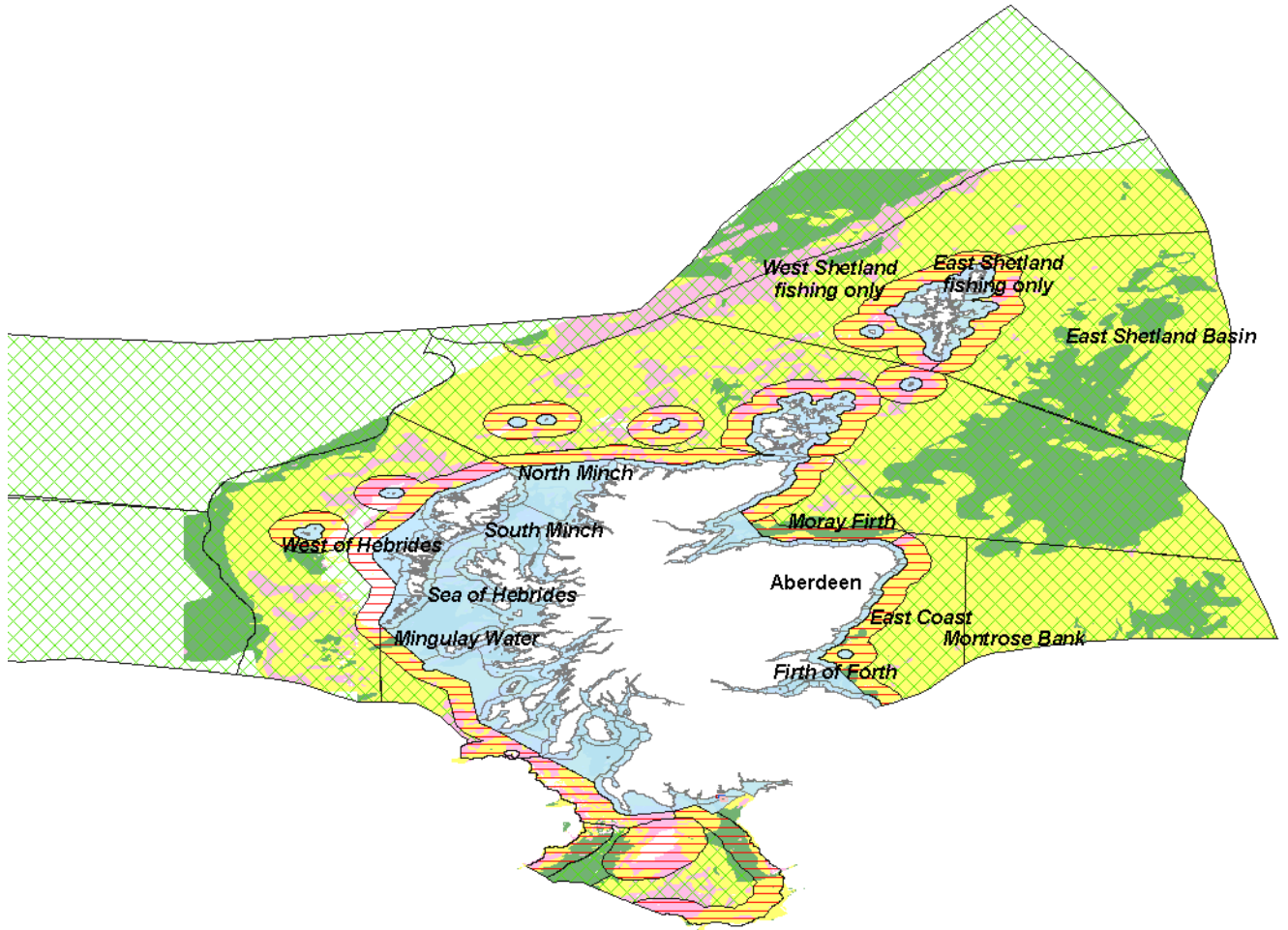
Table 1 CSEMP sampling

CSEMP Site	Water samples (nutrients TOxN, phosphate, silicate, nitrite, and ammonia analyses)	Sediment Chemistry (PAH, CB, BFR, trace metals, PSA, TOC)	Macrobenthos (1mm sieved fraction)	Fish Chemistry Chemistry (CB, BFR, trace metals) and biological effects (EROD and PAH bile metabolites)
Continuous water sampling in support of SCEAS	Yes			
Mingulay Site	5 and 20 m and 20 m from bottom			
East Coast stratified random		5 samples	5 samples	
NMMP 165 (Montrose Bank)		1 sample		5 pools of 5 fish 56 30.00N 001 30.00W
Moray Firth stratified random		5 samples from stratum 1, 10 from stratum 2		
NMMP 95 (Intermediate Moray Firth)		1 sample		
NMMP 105 (Outer Moray Firth)		1 sample		5 pools of 5 fish 58 03.00N 003°00.00'W
North Minch stratified random		5 samples		
South Minch stratified random		5 samples		
NMMP 85 (North Minch) 58°00.00'N 005°40.00'W		1 sample		
Sea of Hebrides stratified random		10 samples	10 samples	
West of Hebrides		5 samples	5 samples	5 pools of 5 fish, new site
East Shetland Basin		3 samples from each of 4 strata	3 samples from each of 4 strata	5 pools of 5 fish, new site
West Shetland				5 pools of 5 fish, new site, time permitting
Shetland northeast coast (Balta)				5 pools of 5 plaice 60 46.19N 000 37.58W

Table 2 Sampling for SEPA - Firth of Forth.

Lerwick (on behalf of SEPA)		
WFD Site	Benthos PSA	Macrobenthos (1mm sieved fraction)
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 B	1 sample, PS only	1 sample
Firth of Forth (on behalf of SEPA)		
CSEMP Site	Sediment Chemistry (organics, metals, TOC and PS)	Macrobenthos (1mm sieved fraction)
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

Figure 1: 0114S Sampling Areas.



Chemicals for survey

Chemical required	Weight	Number of vials
Sulphanilamide	5 g (± 0.1)	15
NEDD	0.5 g (± 0.05)	15
SDS	8 g (± 0.1)	15
SDS	10 g (± 0.1)	10
SDS	1 g (± 0.05)	5
APT*	2.3 g (± 0.05 g)	5
Sodium molybdate	54.81 g (± 0.1)	6
Ascorbic acid	5.5 g (± 0.05)	15
Ascorbic acid	9.1 g (± 0.05)	15
Oxalic acid	5.8 g (± 0.05)	15
Sodium hydroxide	6.5 g (± 0.1)	5
Tetrasodium EDTA	0.6 g (± 0.1)	5
Sodium chloride*	0.8 g (± 0.05)	25
Sodium sulphite*	0.8 g (± 0.05)	8
Disodium tetraborate*	30 g (± 0.1)	20

Preparing		
Solution required	SOP section	Amount Required
Nitrate Stock standard	SOP 0721 9.1.1	2
Nitrite Stock standard	SOP 0721 9.1.2	2 (prep after 21 st Nov)
Phosphate Stock standard	SOP 0721 9.1.3	2
Silicate Stock standard	SOP 0721 9.1.4	2
Ammonia Stock standard*	SOP 0721 9.1.5	2
Triton X-100 50%	SOP 0720 9.2.6	2
Imidazole stock	SOP 0720 9.2.10	2
Copper sulphate stock	SOP 0720 9.2.9	2
Copper activation solution	SOP 0720 9.2.14	1
2N HCl	SOP 0720 9.2.12	1
2N Nitric acid	SOP 0720 9.2.13	2
1N NaOH		500 ml
1N HCl (90mL of 35% 1.18 s.g. per litre)		500 ml
Stock Ortho-phthalaldehyde*	SOP 0720 9.5.4	8
Brij-35, 30%*	SOP 0720 9.2.1	2

Liquid nitrogen
10% Buffered Formalin
48% Ethanol
Hydroxypyrene
Methanol
Heparin
Aprotinin
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