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MRV *Alba na Mara*

Survey 1221A

PROGRAMME

10-24 September 2021

Ports

Loading: Troon, 08 September 2021
Sailing: Troon, 10 September 2021
Unloading: Troon, 24 September 2021

In setting the survey 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 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, to I Gibb and the Survey Summary Report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the Survey Summary Report a nil return is required, if appropriate.

Sampling Gear:

BT 158 with 50 mm cod-end
2 m beam trawl with 50 mm cod-end
Day grab and table
Catamaran and neuston net

Objectives

1. To undertake flatfish sampling in the Clyde and Solway (with sediment) in support of the Clean Seas Environment Monitoring Programme (OSPAR and MSFD D8).
2. To undertake fish sample preparation for subsequent eco-toxicological analyses (biological effects).
3. To undertake survey of seabed litter and sea-surface litter in the Firth of Clyde and Solway Firth (MSFD D10).
4. To undertake sediment sampling in support of the BLUE CARBON project (to update with project details)

Estimated Days per Project: 6 days ST04a (OSPAR & MSFD D8); 2 days ST04c (MSFD D10), 2 days ST014 and 5 days OP06MA

Scientific gear will be loaded on to the *MRV Alba na Mara* in Troon on 10 September. Scientific crew will board the vessel on the same day and sail 11 September after all relevant safety drills have been completed.

Sediment sampling will only be carried out in the Solway Firth (Table 1 and Figure 1), where five sediment samples will be collected. At each location two surface (0-2 cm) sediment

samples will be collected by Day grab, one for contaminant analysis and one for microplastic analysis.

Sediment samples will also be collected in the Clyde region in support of the Blue Carbon project in conjunction with MASTS.

Water sampling will take place at each of the six fishing sites (Table 2, Figure 2) before fishing has commenced. The ship's sea water pump will be used to collect the water samples. At the first two stations, Nisken bottle water sampling will be taken in addition for data comparison. Water samples will be taken for nutrients and salinity. It is important that nutrient samples are not contaminated with fish and therefore require separate freezer (MSS will provide freezer). A single ten litre water sample will also be taken from the inner firth for RGU.

Flatfish (dab, plaice or flounder) will be collected for determination of disease status, contaminant concentrations and contaminant-induced biological effects from the Solway, Bowling, Holy Loch, Hunterston, and Garroch Head fishing stations (Table 2 and Figure 2). Fish sample preparation for subsequent analysis will also take place on board (Table 3). In addition, extra samples will be taken for preparation of EROD laboratory reference material. Benthic macrolitter collected during trawling will also be identified, quantified and recorded.

The catamaran neuston net will be towed at five knots in order to survey and sample sea-surface litter from various locations (see Table 4). Priority areas for sampling include Loch Long and the Solway. If time allows, microplastic analysis may be carried out on board.

If time allows, additional sediment sampling will be undertaken for Blue Carbon in the Sea of Hebrides region.

On completion of the survey, passage will be made to Troon where MSS scientific gear and staff will be unloaded on 19th November 2019.

Rest Day Provision

Rest days are allocated for survey in compliance with SG WTD guidelines.

General Arrangements

Liquid nitrogen, formalin and methanol will be carried for the preservation and storage of biological materials.

Normal contacts will be maintained with the Laboratory.

Submitted: G. Hermann, 06 September 2021

Approved: I. Gibb, 09 September 2021

Table 1: Intended sediment sampling locations.

Region	Area	Site	Lat	Long	Lat	Long
Solway	Solway	Solway Firth @ NMMP25	54.750	-4.000	54 45.00N	003 60.00W
Solway	Solway	Solway Firth BP1	54.767	-3.835	54 46.02N	003 50.10W
Solway	Solway	Solway Firth BP2	54.757	-3.863	54 45.42N	003 51.78W
Solway	Solway	Solway Firth BP3	54.750	-3.916	54 45.00N	003 54.96W
Solway	Solway	Solway Firth BP4	54.727	-3.960	54 43.62N	003 57.60W

Fig 1: Location of intended sediment sampling locations

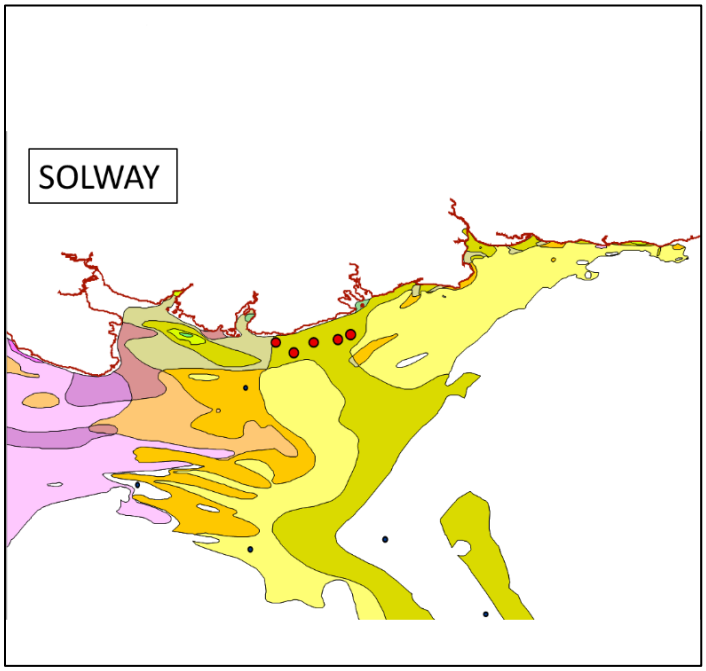

Table 2: Intended fishing locations and fish requirements.

Region - Area	Site	Lat Long		Lat Long (DMS)		Species	No.
Solway - Solway	Solway Firth	54.750	-4.000	54 45.00N	003 60.00W	Dab	50
Clyde - Outer estuary	Bowling	55.925	-4.480	55 55.50N	004 28.80W	Flounder	50
Clyde - Inner Firth	Holy Loch	55.971	-4.892	55 58.26N	004 53.52W	Dab	50
Clyde - Largs Channel	Hunterston	55.764	-4.885	55 45.84N	004 53.10W	Plaice	20
Clyde - Middle Offshore	Garroch Head	55.660	-4.986	55 39.60N	004 59.16W	Plaice	25

Fig 2: Location of intended fishing locations in the Clyde.

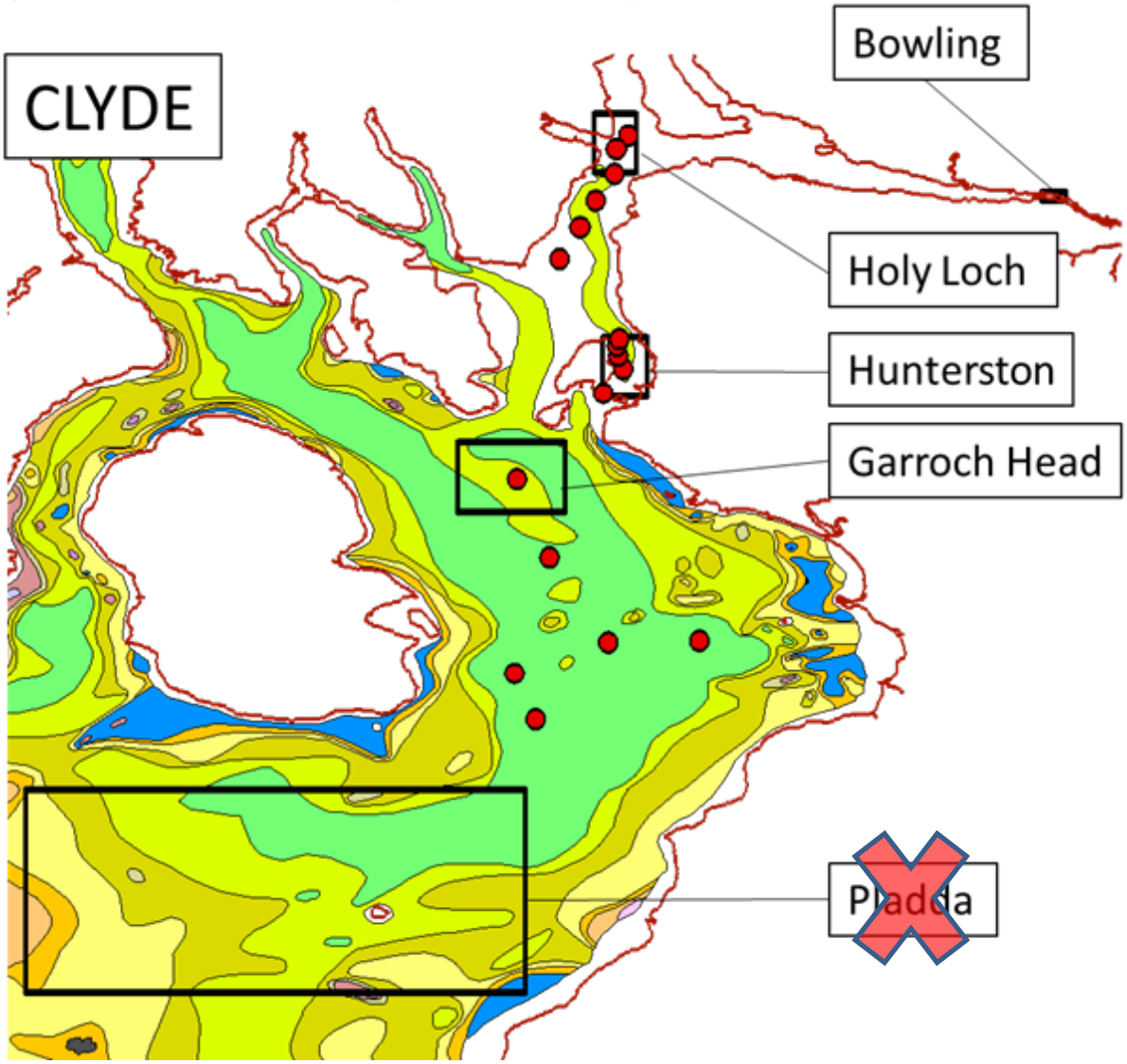

Table 3: Fish sample preparation requirements.

Full sampling details in SOP 0820 and SOP 0830.
At Hunterston site, only chemistry samples are taken. There is no time series here for biological effects, only contaminants.

	Flounder	Dab	Plaice
Total number of fish required	50	50	25
Size range of fish required	20 – 35 cm	20 – 30 cm	20 – 30 cm
Disease	50	50	N/A
Blood	25	25	25
Gills (microplastics)	5	5	5
Bile	25	25	25
Liver (S9 fraction EROD)	15 MALES	15 MALES	15 MALES
Liver (histology)	50	50	N/A
Liver (metals) (~ 2g)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Liver (chemistry) (> 4g)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Liver (RGU)	10	10	NA
Gut (Microplastics)	25	25	25
Gonad (histology)	All MALES only	All MALES only	N/A
Otolith	50	50	N/A
White muscle*	N/A	25	N/A
Flesh (metals) (> 10g)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Flesh (chemistry) (> 30g)	25 (5 pools)	25 (5 pools)	25 (5 pools)
Flesh (RGU)[#]	10	10	NA

*Muscle sampling new for 2019 - a sample of white muscle should be taken as soon as possible, care being taken to avoid contamination of the tissue by excess blood or bile, and placed in a labelled cryovial and snap frozen.
[#] An additional 10 fish are required from Solway Firth, Bowling and Holy Loch only for RGU.

Table 4: Possible catamaran neuston trawl locations with priority areas. Further details in attached map. Cat tows are at 5 kn for 30 min unless otherwise stated.

Cat tow plans.pdf

Region	Details	Priority
Solway	3 tows around fishing / sediment sites 1 tow en route (if possible)	Priority
Loch Long	3 tows right at the top (15 min) 1 near Ardentinny 1 at mouth of Loch Long	Priority
Holy Loch	1 tow	
Gare Loch	1 tow	
Bowling	1 tow	
Inner Clyde	3 tows	
Mid – Outer Clyde	3 tows	

Table 5: Latitude and longitude limits for sediment and fishing sites (extracted from Station dictionary Oct 2017) (decimal)

Matrix	Region	Area	Site	Station dictionary	Nominal Station Latitude	Nominal Station Longitude	Longitude East Limit	Longitude West Limit	Latitude North Limit	Latitude South Limit
SE	Solway	Solway	Solway Firth @ NMMP25	IrishSea_BalcaryPoint_se01	54.750	-4.000	-3.9688	-4.0312	54.768	54.732
SE	Solway	Solway	Solway Firth BP1	IrishSea_BalcaryPoint_se06	54.767	-3.835	-3.8260	-3.8480	54.7750	54.7600
SE	Solway	Solway	Solway Firth BP2	IrishSea_BalcaryPoint_se07	54.757	-3.863	-3.8500	-3.8780	54.7740	54.7550
SE	Solway	Solway	Solway Firth BP3	IrishSea_BalcaryPoint_se08	54.750	-3.916	-3.9050	-3.9270	54.7580	54.7430
SE	Solway	Solway	Solway Firth BP4	IrishSea_BalcaryPoint_se09	54.727	-3.960	-3.9490	-3.9720	54.7370	54.7200
FI	Solway	Solway	Solway Firth	IrishSea_BalcaryPoint_fi01	54.750	-4.000	-3.9221	-4.0779	54.7949	54.673
FI	Clyde	Outer estuary	Bowling	Clyde_ClydeEstuaryOuter_fi02	55.925	-4.480	-4.469	-4.492	55.932	55.923
FI	Clyde	Inner Firth	Holy Loch	Clyde_FirthCInnerDunoon_fi01	55.971	-4.892	-4.874	-4.914	56.005	55.95
FI	Clyde	Largs Channel	Hunterston	Clyde_LargsChannel_fi01	55.764	-4.885	-4.864	-4.906	55.794	55.739
FI	Clyde	Middle Offshore	Garroch Head	Clyde_FirthCMiddleOffshor_fi01	55.660	-4.986	-4.942	-5.043	55.695	55.629
FI	Clyde	Outer Offshore	Pladda	Clyde_SouthArran_fi01	55.420	-5.215	-5.169	-5.271	55.431	55.412