

Not to be cited without prior reference to Marine Scotland, Marine Laboratory, Aberdeen.

MRV *Alba na Mara*

## Survey 1717A

### PROGRAMME

13-17 October 2017

**Loading:** Greenock, 10 October 2017

**Unloading:** Greenock, 17 October 2017

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.

### Personnel

E Dalgarno SIC

G McAllister

D Bailey (Glasgow University)

M Pace (Glasgow University)

H Smith (Strathclyde University)

**Out-turn days: 5 days – project code 20453**

**Environmental Gear:** 1. Craib corer, 2. Day Grab - 0.1m<sup>2</sup>, 3. Autosieve (0.5mm & 1mm mesh sieves), 4. CTD

### Objectives

1. To map spatial distribution of sediment characteristics, infauna composition, pore-water nutrients and organic matter content within the inner Firth of Clyde, Clyde sea lochs and Clyde Estuary.
2. To map the relationship between mean particle grain size and permeability/porosity in the Firth of Clyde.
3. Determine how relationships among sediment properties and sediment nutrient content are modified by natural disturbance, fishing activity and bioturbation potential.

### Procedure

**Figure 1** shows the proposed stations from which grab and core samples of seabed sediment will be collected. Stations are stratified according to depth and sediment mud content (see **Figure 2**).

Stations in the Clyde Estuary and in the vicinity of the isles of Bute and Cumbrae will be sampled Day 1 (13 October). Subsequent sampling days will then focus on sampling stations south of Bute and east of Arran, and stations west of Bute and in Loch Fyne. It is expected that ~ 5 stations will be sampled per day.

The survey anticipates equal emphasis on grab sampling and coring. The target would, therefore, be six cores, two grab samples and one CTD profile from each station.

### **Grab sampling**

Two replicate grab samples will be collected per station. Subsamples will be taken from each grab samples and frozen for subsequent laboratory analysis of grain size distribution, % TOC/TN, sediment Chlorophyll-a & Phaeophytin-a content. The remaining sample will be sieved through a 0.5 mm mesh and the retained material preserved in 4% Saline Formaldehyde for subsequent laboratory extraction and identification of benthic invertebrates. Samples will augment data from SEPA and SNH, and provide estimates of benthic biomass for hitherto unsampled areas.

### **Coring**

It is possible that coring will not be possible in sediments with low mud content and high tidal currents. Hence, coring will be attempted until three hours elapse or six cores are collected.

Assuming the collection of six replicate cores per station, three will analysed for permeability, porosity and grain size distribution, and three for pore-water nutrients (Ammonium, Phosphates, Silicates and Nitrates), with the extraction of four pore-water nutrient samples and 3 measurements of porosity per core.

Sampling 20 stations would yield:

- (Core samples from 10 stations) 60 cores
  - 30 overlying water nutrient samples
  - 90 pore-water nutrient samples
  - 30 overlying water Chl-a & Pheo-a
  - 30 measurements of permeability
  - 90 measurements of porosity
  - 180 measurements of PSA
- (Grab samples from 20 stations) 40 grab samples
  - 40 PSA samples
  - 40 %TOC/TN samples
  - 40 Sediment Chlorophyll-a & Phaeophytin-a content
  - 40 Benthic infauna samples

### **Ancillary Information – Chemicals to be Carried**

1. 4% Formaldehyde - Seawater solution (~20L) - 40% aqueous Formaldehyde is diluted with seawater and stored above 5°C.
2. Di-sodium tetraborate 10-hydrate GPR (Borax) - Added at a concentration of 1g / 500ml of formosaline. Serves to prevent dissolution of bivalve shells by neutralising acidity.
3. Acetone.

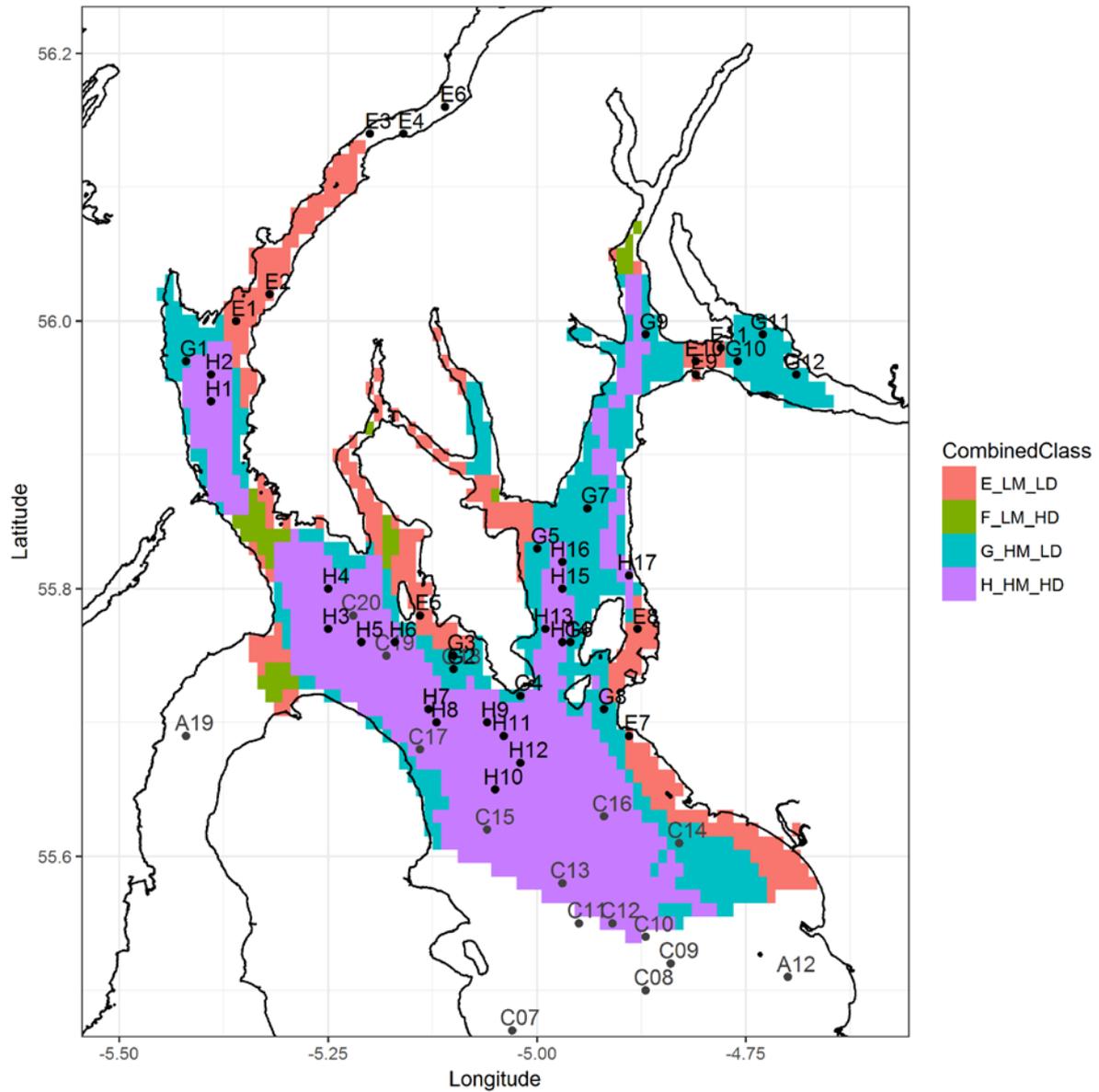
Normal contact will be maintained with the Marine Laboratory.

Submitted:  
E. Dalgarno  
04 October 2017

Approved:  
I. Gibb  
09 October 2017

**Figure .:** Map showing the proposed sampling stations (Black points) and stations sampled in April 2017 (grey points) in the Firth of Clyde superimposed over gridded stratified clusters of high and low mud content (>25%) and depth (50m).

**E\_LM\_LD:** Low Mud / Low Depth, **F\_LM\_HD:** Low Mud / High Depth, **G\_HM\_LD:** High Mud / Low Depth, **H\_HM\_HD:** High Mud / Low Depth.



**Figure 2:** Maps of the Firth of Clyde superimposing proposed sampling stations (Black points) and stations sampled in April 2017 (grey points) over spatial distributions of fishing effort (number of vessels) for vessels < 15 m. ScotMap data.

