

Carbonate Characterisation of Scotland's Coastal Waters.

Brief Report - MASTS Small Grant Award code: SG85

Climate change and its potential impact is a hot topic for research in Scotland and a key focus for the MASTS community, however, there is very little information available on the current carbonate chemistry of the shallow coastal waters of Scotland. This information is vital for understanding the current relationships between organisms and the seawater in which they live and helping to predict what might happen to them under future climate change scenarios.

This grant application asked for assistance in funding water sample analysis to complete two data sets which will help to increase our understanding of the seawater chemistry of the shallow seas around Scotland. Financial support from MASTS allowed complete carbonate analysis of 90 water samples from around Scotland and nutrient analysis of 78 water samples. This data added to collected *in situ* temperature and salinity data sets consisting of >200,000 temperature and >35,000 salinity measurements.

The total data sets which have been produced are:

A one year time series (May 2012- May 2013) data set covering 5 sites (Millport, St Abbs, Stromness, Kirkwall and Scapa Flow. Temperature and salinity was measured hourly and water samples for nutrient and carbonate analysis were collected either bimonthly (Orkney sites) or monthly (Millport and St Abbs) at set depths.

A wide reaching set of spot measurements (collected in the same season) from 32 marinas around Scotland. Measurements included temperature, salinity, pH, carbonate and nutrient analysis.

The water samples and data were collected with fieldwork and/or diving assistance from staff and students from Heriot-Watt University, UMBS Millport, Natural History Museum London, SAMS, NAFC marine centre Shetland and St Abbs Voluntary Marine Reserve.

The datasets are being analysed as components of Jennifer Loxton's PhD thesis prior to publication. Projects include:

- 1) Investigating seasonal changes in seawater chemistry and its impact on skeletal chemistry of marine bryozoans. This is a two year settlement panel experiment at three sites around Scotland (Scapa Flow, St Abbs and Millport). The experimental components are complete and the thesis chapter and manuscript is currently in preparation.
- 2) Investigating the influence of seawater chemistry on the ecology, growth and range of an invasive bryozoan including characterization of preferred habitats. This is an in depth study into the invasive bryozoan, *Schizoporella japonica*, concentrating on its highly adaptable skeleton and how this influences its success as an invasive species. This includes both spot

measurements at marinas around Scotland, where *S.japonica* is both present and absent, and a year long time series study at two Orkney marinas. Preliminary results for this project have been presented at the International Bryozoology Association Conference, Catania 2013 and at the European Marine Biology Symposium, Galway 2013 where they were well received. The thesis chapter and research paper are currently in preparation.

It is anticipated that research papers for both project components will be submitted for publication in peer reviewed journals in early 2014.

MASTS Small Grant SG85 was used to pay for the following items:	
Carbonate water analysis (90 samples (£12 each) at Carbonate Chemistry Facility, NOC, Southampton)	1080
Shipping of samples to analysis centre	150
Nutrient analysis consumables (Hach Lange nitrates, silicate, phosphate test kits + universal tubes)	166
TOTAL COST	£1396