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FRV *Alba na Mara*

## **Cruise 0910A**

### **REPORT**

16-27 July 2010

**Loading:** Fraserburgh, 14 July

**Unloading:** Fraserburgh, 27 July

### **Personnel**

M Gubbins (SIC)  
D Lichtman  
J Graham  
G Hermann  
S Kinnear  
D Stone (Day visitor from NAFC; 21 July)

**Project codes:** AE11103 11 days out-turn

### **Equipment**

Proteus workboat and 100 L unleaded fuel  
Sealogger CTD/Rosette  
Autosampler mooring  
Day grab  
Bongo zooplankton net  
Light microscope  
Plankton nets

### **Objectives**

- 1) To conduct plankton and hydrographic surveys in Shetland (focusing on SW area at first) to locate any areas where *Alexandrium* dinoflagellates are present.
- 2) To deploy autosampler mooring and nutrient analyser either where *Alexandrium* are found to be present by initial survey or in Busta Voe
- 3) To deploy and recover multiple (maximum 20) SPATT moorings adjacent to shellfish farms throughout the surveyed area.
- 4) Conduct repeated plankton and hydrographic sampling along a transect in St Magnus Bay and in voes to provide data on the progression of *Alexandrium* events (if present) and provide background data for models of *Alexandrium* occurrence in relation to hydrographic conditions and the effects of aquaculture on voe water quality.

- 5) To collect sediment samples for phytoplankton cyst identification throughout the survey area.
- 6) To collect sediment samples from Sullom Voe for analysis of TBT concentrations.
- 7) To continuously monitor T&S and chlorophyll a in surface waters and surface irradiance during the cruise.
- 8) To collect samples of dogwhelks from shoreline sites in the Scalloway area and receive samples from Bressay being collected by SEPA staff.

## **Narrative**

After loading on 14 July, scientists boarded the vessel on 16 July and departed for Shetland at 0800 on 17 July, due to forecasted high wave heights to the south and west of Shetland on the evening of 16 July. Sea conditions to the SW of Shetland were expected to still be poor on 18 July, so sampling commenced in the NE of Shetland at Basta Voe with CTD profiles and plankton hauls at three stations and a single Day grab. Two SPATT moorings were also deployed in the vicinity of mussel farms in the Voe. This sampling regime was repeated in Mid Yell Voe (with only a single mooring deployment) before steaming to Collafirth in Yell Sound to anchor overnight. On 19 July a series of 11 Day grab samples of sediment for TBT analysis were completed in Sullom Voe and a single CTD cast was completed in the upper basin to calibrate the oxygen sensor (low DO values are anticipated in this basin). *Alba* then steamed for Ronas Voe where three hydrographic stations were sampled, including plankton tows and a SPATT mooring deployed by a mussel farm, mid-Voe. Notably low DO levels were recorded in the upper basin of the Voe.

After steaming to St Magnus Bay a transect of six hydro stations was commenced, with full depth phytoplankton samples being taken from the rosette bottles at discrete depths and phytoplankton and zooplankton tows conducted at all stations. Only four stations were completed of this transect before the end of the working day and *Alba* steamed into Busta Voe to anchor overnight. On 20 July the auto-sampler and nutrient analyser were deployed on a mooring in the middle of Busta Voe and hydro-stations/plankton sampling conducted in Busta Voe, Olna Firth and Aith Voe. Two SPATT moorings were deployed in Olna Firth and a single mooring deployed in Aith Voe. *Alba* departed the Swarbacks Minn area to make for Scalloway, arriving by 2000.

Daniel Stone (NAFC) boarded the vessel (with dogwhelk samples from Scalloway area) on the morning of 21 July and surveys of the Scalloway area Voes were conducted. Sandsound Voe, Vaila Sound and Gruting Voe. In each area a minimum of three hydro-stations were sampled by CTD and plankton net, a single grab sample was taken for cyst analysis and SPATT moorings deployed. In Gruting Voe, the Proteus workboat was launched to sample Browland Voe at the head of Gruting (shallow sill prevents access by *Alba*) since monitoring data suggested that *Alexandrium* were recently present in the area. Hydrographic data were collected by reversing bottle and plankton hauls completed. A SPATT mooring was deployed in the upper Voe. *Alba* returned to Scalloway and collected a further dogwhelk sample from Bressay, collected by SEPA and Daniel Stone disembarked.

*Alba* continued to survey Voes in the Scalloway area on 22 July with Clift Sound and Weisdale Voe surveyed by CTD, plankton haul, Day grab and SPATT mooring deployment adjacent to shellfish farms. *Alba* then returned to repeat surveys in Vaila Sd and Gruting Voe and Proteus

was launched again to repeat survey of Browland Voe, this time with a mini-CTD deployed by Snella reel and to gather repeat plankton samples. *Alba* then steamed to Busta Voe, anchoring overnight on the sill of the Voe. This allowed scientific staff to deploy the mini-CTD from a Snella reel hourly over a full tidal cycle to gather data required for hydrographic modeling of Busta Voe.

The auto-sampler mooring was recovered on the morning of 23 July. On recovery it was evident that the nutrient analyser had leaked due to cracks in the housing and had failed to record any data. The Auto-sampler was redeployed in Aith Voe due to news that recent monitoring data from SAMS suggested *Alexandrium* had recently been present there at the 'Slyde' shellfish farm. Hydrographic sampling was repeated at Aith Voe and a line of seven CTD stations sampled along the length of Busta Voe to aid the hydrographic modeling of the area. These would be repeated later in the cruise at a different tidal state. Hydrographic and plankton samples were taken again in Olna Firth, before *Alba* sailed to Ronas Voe to anchor overnight.

On 24 July, CTD and plankton sampling was conducted in Ronas Voe and the SPATT mooring recovered. *Alba* then steamed to Basta Voe (through Bluemull Sound) to repeat hydrographic and plankton sampling there and recover the two SPATT moorings. The SPATT mooring in Mid-Yell Voe was also recovered and three CTD stations sampled (and plankton samples taken) in the Voe. *Alba* then made passage back to St Magnus Bay to repeat the transect of six stations leading into Swarbacks Minn with CTD, zooplankton and phytoplankton net sampling. Only two stations were completed by the end of the working day and *Alba* overnighted lying off St Magnus Bay to be on station the following morning and complete the line of stations.

After completing these on 25 July, the line of seven CTD stations in Busta Voe were repeated (at three hours before the tidal state of previous sampling) and plankton samples taken from Busta Voe, Olna Firth and Aith Voe. SPATT moorings were recovered from Olna Firth and Aith Voe and a single mooring redeployed at 'Slyde' in Aith Voe. The auto-sampler mooring was recovered from Aith Voe and grab samples taken from Busta, Olna Firth and Aith Voe. The sample from Aith Voe was coarse in nature and obtaining a muddy sample was not possible due to the hard substrate.

*Alba* steamed to Gruting Voe and deployed the Proteus workboat to sample Browland Voe and redeploy the SPATT mooring there. Meanwhile *Alba* completed a hydro-station in Gruting Voe and recovered SPATT moorings in Gruting Voe and Vaila Sound, redploying one of the moorings with fresh SPATT bags at Vaila Sound. After recovering the Proteus workboat and departing for Fraserburgh, *Alba* arrived back in Fraserburgh at 1500 on 26 July and was unloaded on the morning of 27 July.

## Results

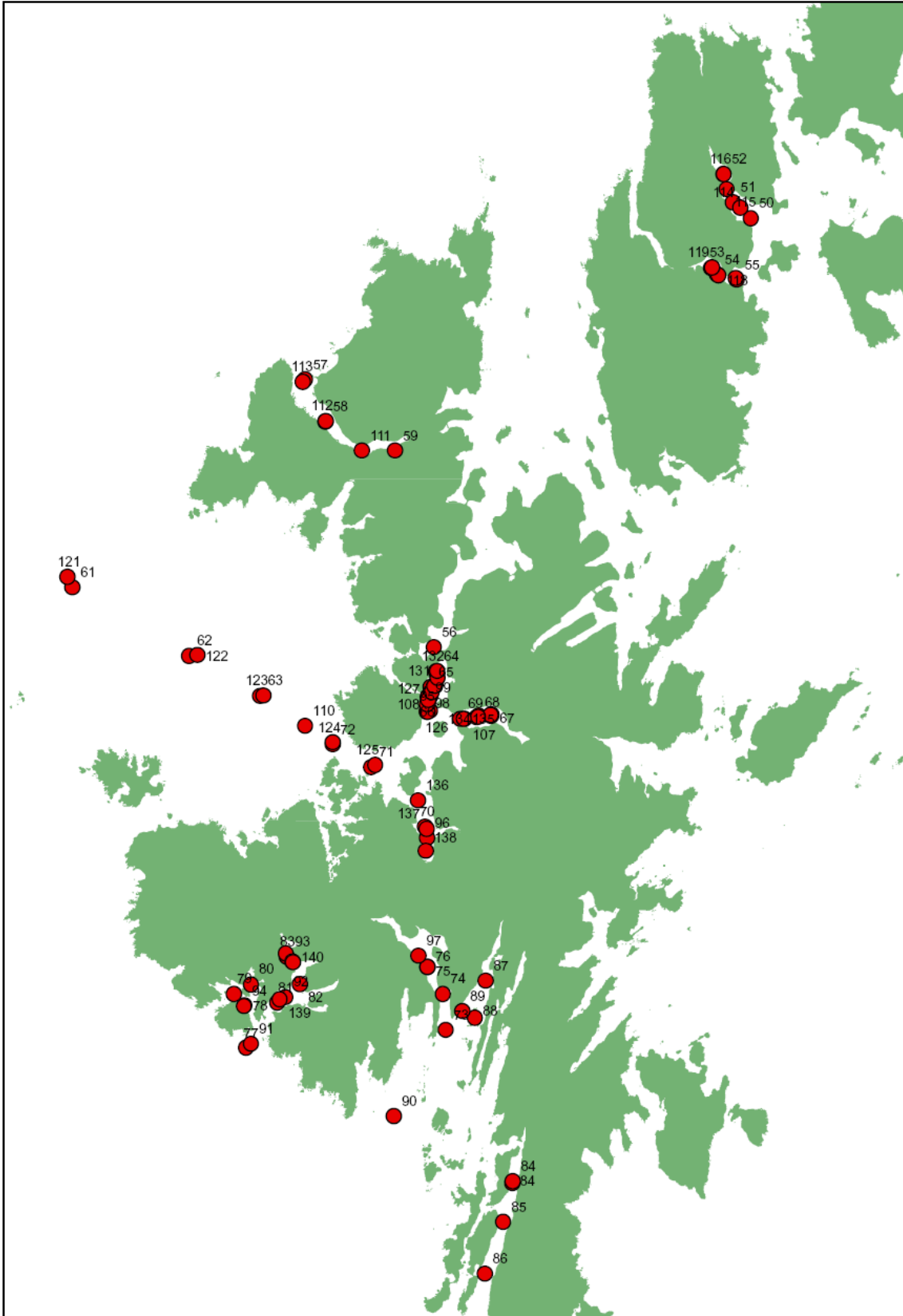
During the course of the cruise 94 hydro-stations around Shetland were worked by CTD, at which 65 surface phytoplankton samples and 56 zooplankton samples were taken. Twenty three grab samples were taken. Eleven in Sullom Voe for TBT analysis and twelve in Voes supporting shellfish farms for phytoplankton cyst analysis. Nineteen SPATT moorings were deployed and 12 of these recovered, the remainder being left for shellfish farmers to collect. The plankton auto-sampler was deployed in Busta Voe for three days and then redeployed in Aith Voe for three days. The nutrient analyser deployed with the auto-sampler flooded due to manufacturing defect during it's first deployment and no nutrient data was recorded. The sampling conducted in different areas is reported in the Table below.

Voe/Working Area	Date	Hydro-stations	Surface phytoplankton	Zoopankton	Full depth phytoplankton	Grabs	Moorings deployed
Basta Voe	18//07/10	3	2	2	-	1 cyst	2 x SPATT
	24/07/10	3	2	2	-	-	Recovered
Mid Yell Voe	18//07/10	3	2	2	-	1 cyst	1 x SPATT
	24/07/10	3	2	2	-	-	Recovered
Sullom Voe	19/07/10	1	-	-	-	11 TBT 1 cyst	-
Ronas Voe	19/7/10	3	2	2	-	1 cyst	1 x SPATT
	24/7/10	3	2	2	-	-	Recovered
St Magnus Bay	19-20/7/10	6	6	6	6	-	-
	23/7/10	1	1	1	1	-	-
	24-25/7/10	6	6	6	6	-	-
Busta Voe	20/07/10	3	2	2	-	-	Autosampler
	22-23/7/10	7	3	3	-	-	Recovered 23
	25/07/10	7	2	1	-	1 cyst	
Olva Firth	20/07/10	3	2	2	-	-	2 x SPATT
	23/7/10	3	2	2	-	-	
	25/7/10	3	1	1	-	1 cyst	Recovered
Aith Voe	20/7/10	1	1	1	-	-	1 x SPATT
	23/7/10	2	2	2	-	-	Autosampler
	25/7/10	3	2	1	-	1 cyst	Recovered & 1x SPATT
Sandsound Voe	21/7/10	4	2	2	-	1 cyst	2 x SPATT
Vaila Sound	21/7/10	4	3	3	-	1 cyst	2 x SPATT
	22//7/10	1	1	1	-	-	
	25/7/10	0	0	0	-	-	Recovered & 1 x SPATT
Gruting/Browland Voe	21/7/10	3	3	2	-	1 cyst	-
	22/7/10	4	2	1	-	-	2 x SPATT
	25/7/10	2	2	1	-	-	
Clift Sound	22/7/10	3	2	2	-	1 cyst	1 x SPATT
Weisdale Voe	22/7/10	4	3	3	-	1 cyst	1 x SPATT

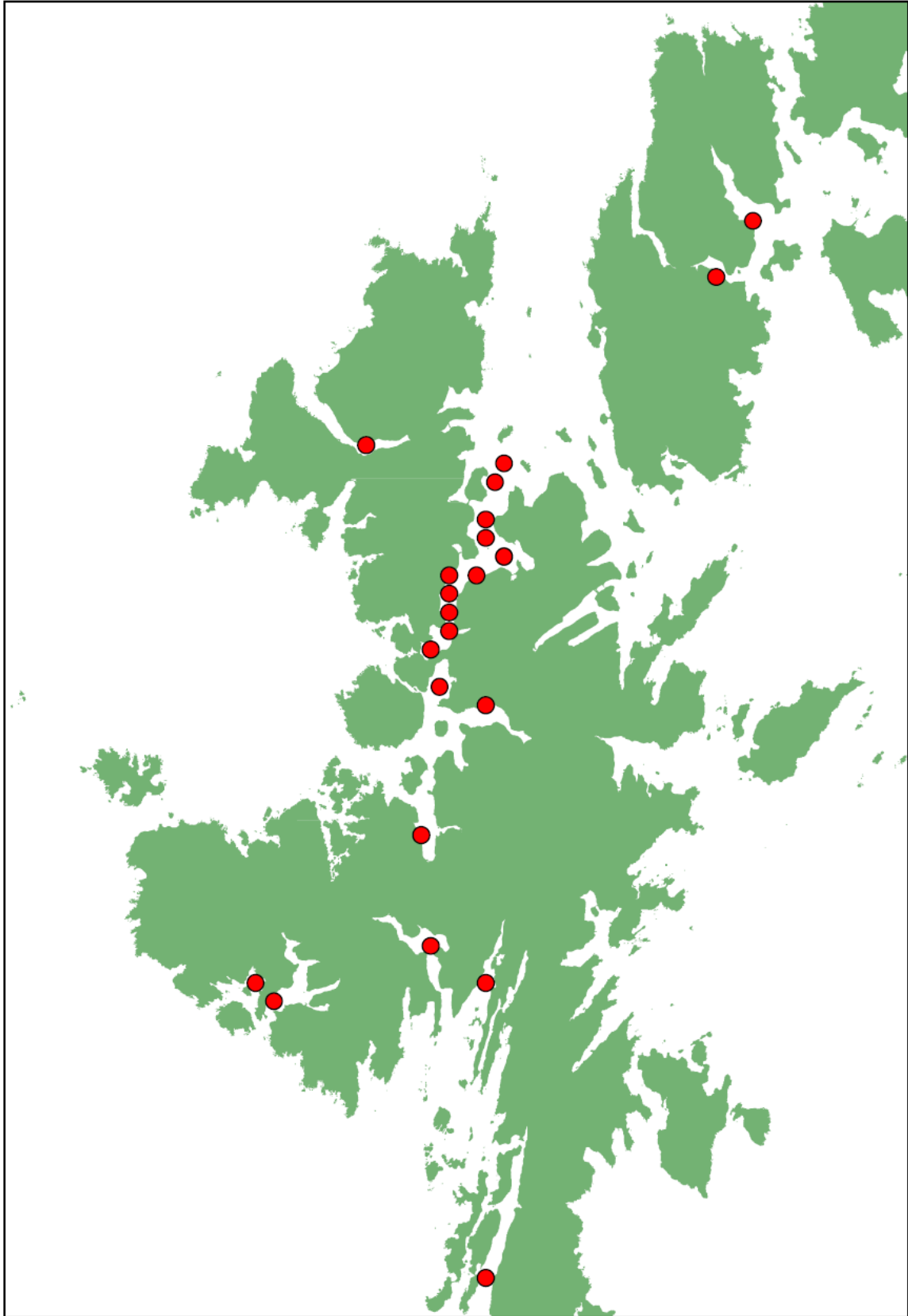
### Progress against Objectives:

- 1) Eleven Voes and a six station transect out of St Magnus Bay were surveyed (on one to three occasions) in the search for *Alexandrium*. Surveys were commenced in the NE rather than the SW due to forecast weather for SW area on the first day of survey. No *Alexandrium* was evident in light microscopy samples or PSP toxins in plankton samples by JRT immunoassays during the survey. However, data from the FSAS plankton monitoring survey suggests that low numbers of *Alexandrium* may have been present during surveys in Aith and Browland Voes. These samples will be prioritised for analysis.
- 2) The autosampler (and nutrient analyser) were deployed in Busta Voe initially for
- 3) three days. Regular plankton samples were taken and fixed by the instrument during this time, however, the nutrient analyser failed due to a leak. On 23 July due to data from SAMS/FSAS that *Alexandrium* were recently present in Aith Voe, the auto-sampler was redeployed in Aith Voe and successfully sampled regularly for a further three days prior to collection on 25 July before departure for Fraserburgh.
- 4) Seventeen SPATT moorings were deployed in 11 Voes (and SPATT samples were included on two deployments of the auto-sampler). Seven SPATT moorings were left deployed close to shellfish farms for farmers to recover after one to two weeks deployment.
- 5) A transect of hydrographic stations was conducted twice out of St Magnus Bay and into Busta Voe at different tidal states. In addition a mini-CTD was deployed hourly at anchor over the sill to Busta Voe overnight to gather data on tidal exchange into the Voe for hydrographic modeling purposes.
- 6) Twelve sediment (muddy substrate) samples were collected by Day grab from different Voes for future analysis by qPCR to try to determine if particular *Alexandrium* strains are present in the area in resting stage.
- 7) Eleven grab samples were taken from Sullom Voe (with port Authority permission) for analysis for TBT.
- 8) The thermosalinograph and fluorometers were continuously recording data from the non-toxic water supply on board to log chlorophyll and salinity. Chlorophyll and salinity calibration samples were taken from the non-toxic supply throughout the cruise.
- 9) Dogwhelks were collected from two sites in Scalloway by NAFC staff and delivered to the *Alba* by visitor Dan Stone. SEPA, Lerwick, staff collected samples from the Bressay shoreline and delivered them to NAFC for collection. Dogwhelks were kept alive on board using a small tank connected to the non-toxic supply and returned to aquarium facilities at Aberdeen after the cruise.

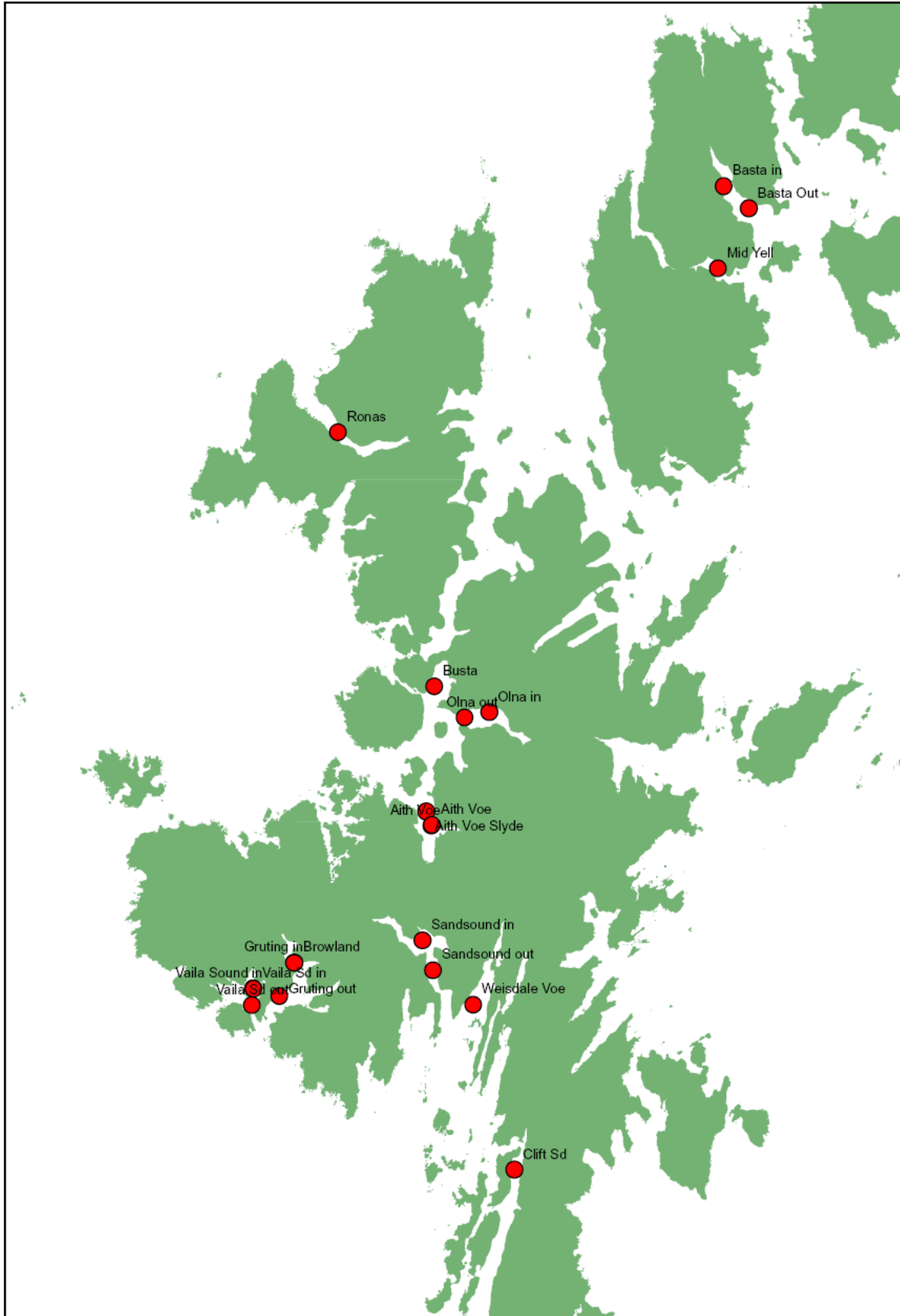
Matt Gubbins  
27 July 2010



Positions of hydrostations sampled during 0910A.



Positions of grab samples taken during 0910A.



Positions of SPATT and Autosampler mooring deployments during 0910A.