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FRV *Alba na Mara*

Cruise 0110A

REPORT

11-24 February 2010

Ports

Sailing: Fraserburgh 11 February 2010

Unloading: Ullapool 24 February 2010

Personnel

A Weetman (SIC)

C Shand

A Tait

Gear

50 mm prawn trawl BT 149B.

Day grab and table

Towed TV sledge, TV drop frame, 600m umbilical towing cable, Konesberg video camera (OE14-366, 11-14 February; OE13-366 14-24 February) and Konesberg digital stills camera (OE14-208 DSC), plus backup.

Objectives

- To obtain estimates of the *Nephrops* habitat distribution in West Coast Sea Lochs, using sediment grabs and underwater cameras.
- To obtain estimates of the distribution and abundance of *Nephrops* within these lochs using underwater video cameras.
- To use the video footage to record occurrence of other benthic fauna and evidence of commercial trawling activity.
- To collect trawl caught samples of *Nephrops* for comparison of reproductive condition and morphometrics.

Project Time: 14 Days MF01TA/10066

Narrative

All scientific staff joined FRV *Alba na Mara* in Fraserburgh at 1000 on 11 February 2010 and the vessel set sail at 1500. After catching the midnight tide in the Pentland Firth the *Alba na Mara* arrived at Loch Inchar at 0900 on 12 February. The day was spent working east to the head of the loch deploying the drop frame along the length and breadth of the loch, until at station 13 the density of creels halted any further TV work in that direction. At this point the vessel retraced the path of the video survey covered earlier in the day, and at each TV site a sediment sample on suitable *Nephrops* grounds was collected. After gathering footage from 13 TV sites and sediment from 11 of these stations (2 sites were found to be rock) the vessel tied up alongside Kinlochbervie pier early that evening.

The following morning in Loch Inchard a further four TV sites were surveyed and four sediment samples were taken. Various technical issues relating to the video equipment were dealt with before heading to Loch Laxford around midday. On arriving at Loch Laxford the ship experienced power distribution difficulties which resulted in only being able to carry out TV work until this issue was resolved. For the remainder of the day the vessel surveyed TV sites within Loch Laxford before anchoring at the head of the loch.

On the morning of 14 February the video camera (model OE14-366) on the drop frame was replaced by the older model (model OE13-366) to overcome a problem with the lack of control with the focus. Once this was done, TV work continued and the investigation for the muddy sediment boundary at the head of Loch Laxford was resumed. Further searches on the south side of the loch to find the muddy sediment distribution limits were hampered by creels and several sites had to be aborted; but the presence of creels at these sites, and local information, indicated suitable *Nephrops* habitat. By 1130 the only significant areas within the loch that had not already been surveyed were inaccessible due to creels or mussel farms. Based on this, and the fact that the vessel had to return to Kinlochbervie that night to allow an engineer to address the power distribution issues, the vessel revisited Loch Inchard and surveyed a further five sites improving the spatial coverage and detail of the loch.

On the morning of 15 February, with temporary repairs made to the ship's hydraulic system, the vessel sailed from Kinlochbervie pier and collected the sediment samples from the additional sites covered by the TV the previous day in Loch Inchard and those in Loch Laxford. At midday the vessel made way for Eddrachillis Bay, but the sea proved too rough for camera work and so the ship proceeded for Glen Coull, arriving at the head of the loch at 1330. Five successful TV tows were carried out over the following 5 hours, with boundaries between hard ground and suitable *Nephrops* ground being clearly established.

Experiencing a strong north westerly wind the vessel left the anchorage in Glen Coull at 0800 the next morning to carry out two further TV stations on the northern edge of the loch, followed by an attempt to survey at the mouth of the loch. However the weather was too severe and with the high risk of entanglement with the creels in the area the vessel returned to collect the sediment samples at the TV surveyed sites covered earlier in the morning. By midday all the sites had been revisited and sediment samples had been collected. Work then began in Glen Dhu. Due to the very strong wind it was not possible to safely operate the TV sledge in the loch, but it was possible to collect sediment samples. By 1330 nine samples had been taken before the weather deteriorated to a point that work had to stop and the vessel went to anchor at the head of the loch.

By midday on 17 February all 6 TV sites had been surveyed in Glen Dhu, and so the vessel headed west and out towards Chairn Bhain. With the weather improving all the time a further 6 TV sites were surveyed, as well as collecting sediment samples at these sites. From the bathymetry charts and the presence of creels it was apparent that there was a strip of soft sediment running along the north edge of the loch. Due to the density of the creels in this area the camera could not be deployed, and so the vessel transversed along the length of the area being fished. Whilst carrying out these maneuvers the positions of where the sediment changed significantly from hard to soft mud, and vice versa, were recorded, thus providing an accurate boundary of the soft sediment albeit without visual corroboration. At 16:30 the vessel began the thirty minute journey to the anchorage at Unapool at the mouth of Glen Coull.

With snow down to sea level the vessel set off on 18 February towards Eddrachillis Bay, an hour away to the west. Using VMS data an area within the bay had been identified as *Nephrops* fishing ground. Transects were overlaid on the VMS data and a grid search was initiated. From the readings on the ship's sounder, some of the stations at the edge of the

survey area were obviously bedrock. At these sites the depth and position was recorded without deploying the camera, yet at most of the other stations camera and grab work continued as normal. Once darkness fell the vessel headed for an anchorage in Achmelvich Bay.

After a two hour steam the vessel arrived in Loch Broom on the morning of 19 February. Camera sites were selected on the north and south sides of the loch as well as the central area. Two further camera deployments were taken in upper Loch Broom before tying to Ullapool pier for the night.

On 20 February more camera work was carried out in Upper Loch Broom before revisiting all the camera sites surveyed that morning and from the previous day to gather associated sediment samples. At 1500 the vessel entered Little Loch Broom and continued with camera work until 1830 when the ship went to anchor on the east side of the loch.

The vessel proceeded up Little Loch Broom the following day, regularly deploying the camera *en route* to the head of the loch in calm, sunny but cold conditions. Additional stations were introduced as the boundary between hard ground and the softer *Nephrops* ground could not always be located at the scheduled sites. Once the camera work was completed within Little Loch Broom the vessel returned to each site to obtain a sediment sample before going to anchor to the south of Gruinard Island.

22 February was spent carrying out camera work and collecting sediment samples to the north and west of Gruinard Island and around an area of apparent mud that was noted on the ship's sounder as the vessel headed for the anchorage the previous night.

Leaving the Gruinard anchorage for the second time, the vessel continued to survey around Gruinard Island on 23 February until mid afternoon when the work was brought to an end before heading to Ullapool to begin preparations for leaving the vessel the following day.

On 24 February after unloading all the scientific gear from the vessel, cleaning the work areas and completing the debrief, all scientific staff and some of the ship's compliment departed the vessel and headed by minibus back to Aberdeen, via Fraserburgh.

Results

The main objective of this cruise was to try and establish the boundaries of suitable sediment for *Nephrops* habitation within the northern lochs on the west coast of Scotland using under water television (UWTV) and to support these findings with sediment samples. It was hoped that at future Working Groups these results would provide a more accurate value for each loch to raise the observed burrow abundance values to, by using the surface area of suitable sediment rather than the surface area of water within each loch.

The drop frame was used throughout the cruise, which compared to the TV sledge, minimised the risk of entanglement with creels and damage to TV equipment as hard ground and rocks were expected to be encountered. The drop frame was suspended vertically from the aft of the vessel, and so it was appropriate to use the ship's position and depth of water at that point in reference to the TV station's details.

All except for Eddrachillis Bay, the location of each TV station was selected to be as best as possible representative of that area. At times there were some limiting factors such as creels, mussel farms, geological features, time and weather. When the vessel was about to carry out a site survey, it made way to the scheduled position and then, with the camera lowered to the seabed, where it was it hoped that the vessel, and so too the camera, would drift either on to or off the hard ground depending on the prevailing conditions. Whilst

drifting, observations of features, changes to the benthic composition, fauna, and any anthropogenic activity were recorded.

At Eddrachillis Bay the survey was led by VMS data. This data showed an east to west line of activity and the survey was planned so that TV sites intercepted the area of VMS data.

Figure 1 below displays the lochs visited. Figure 2 summarises the areas visited; the number of UWTV stations surveyed; the number of sediment samples taken within each area; the number of stations where the boundary between hard ground and suitable *Nephrops* burrowing sediment (indicated by the presence of *Nephrops* burrows) could be identified; the number of significant observations made with and without the UWTV (i.e. sonar or by the presence of creels).

Figures 3 to 8 illustrate exactly where each TV site was located within each area. Due to the projection of the plots, the position of the targets in each figure belies the close proximity to the shore that the vessel was maneuvered in to.

Figure 9 shows in greater detail an example of one of the study areas showing visual examples of the 'significant observations' that were recorded. Due to the volume of data collected it is not possible to present all the data in this cruise report. However, a report will be available by November 2010 containing all the data gathered, which will be submitted to the *Nephrops* Study Group (SGNEPS, Lisbon, 2010).

These 'significant observations' were the result of using either the UWTV drop frame, acoustic data or sightings of creels in a survey area being surveyed. The latitude, longitude and depth were recorded at the location of each of these observations. Such significant observations included visibly obvious changes on the sea bed (using the UWTV), sediment composition variations on the ship's sounder or the occurrence of creels being fished in an area (indicating suitable *Nephrops* habitat).

Tow length varied from 10 to 60 minutes. The reason for the range was due to either the run was being carried out for burrow abundance purposes on established *Nephrops* grounds and so only a 10 minute recording was required (as internationally agreed at various *Nephrops* study groups); the sediment boundary had not been established (longer runs); or there were external influences (weather, shellfish farms, shoreline, etc).

Some of the sites that were surveyed over an extended period of time (up to an hour) appeared to have no change in sediment or habitat throughout the run, which although does not result in providing a position for the muddy sediment boundary it does still provide detailed benthic information over a large area. In these areas despite not being able to determine the *Nephrops* habitat boundary (due to physical limitations – time, distance from shore, weather, etc), the presence or absence of mud, *Nephrops* burrows and/or *Nephrops* themselves was still recorded.

Many of the video recordings contained enough suitable footage to derive *Nephrops* burrow abundance values. The detailed figures below of each loch indicate this.

No trawling was carried out on this cruise. The most suitable trawl sites in the region were off Rona and as the cruise managed no further south than Little Loch Broom, it was felt that the time spent steaming to and from the fishing grounds would be better spent carrying out TV and sediment work. Trawl data from the Rona area is available from previous cruises.

Initial results from this cruise confirmed that the areas of suitable *Nephrops* habitat varied within the areas studied and was not uniformly distributed over the whole area. On occasion

the muddy sediment almost reached the shoreline and in other areas this sediment was only found in small patches.

Further investigation is required to confirm what appeared to be an occasional correlation in the data between depth and sediment type, but again that varied between lochs and bays.

A Weetman
10 June 2010

Alba 0110A West Coast UWTV Survey Areas

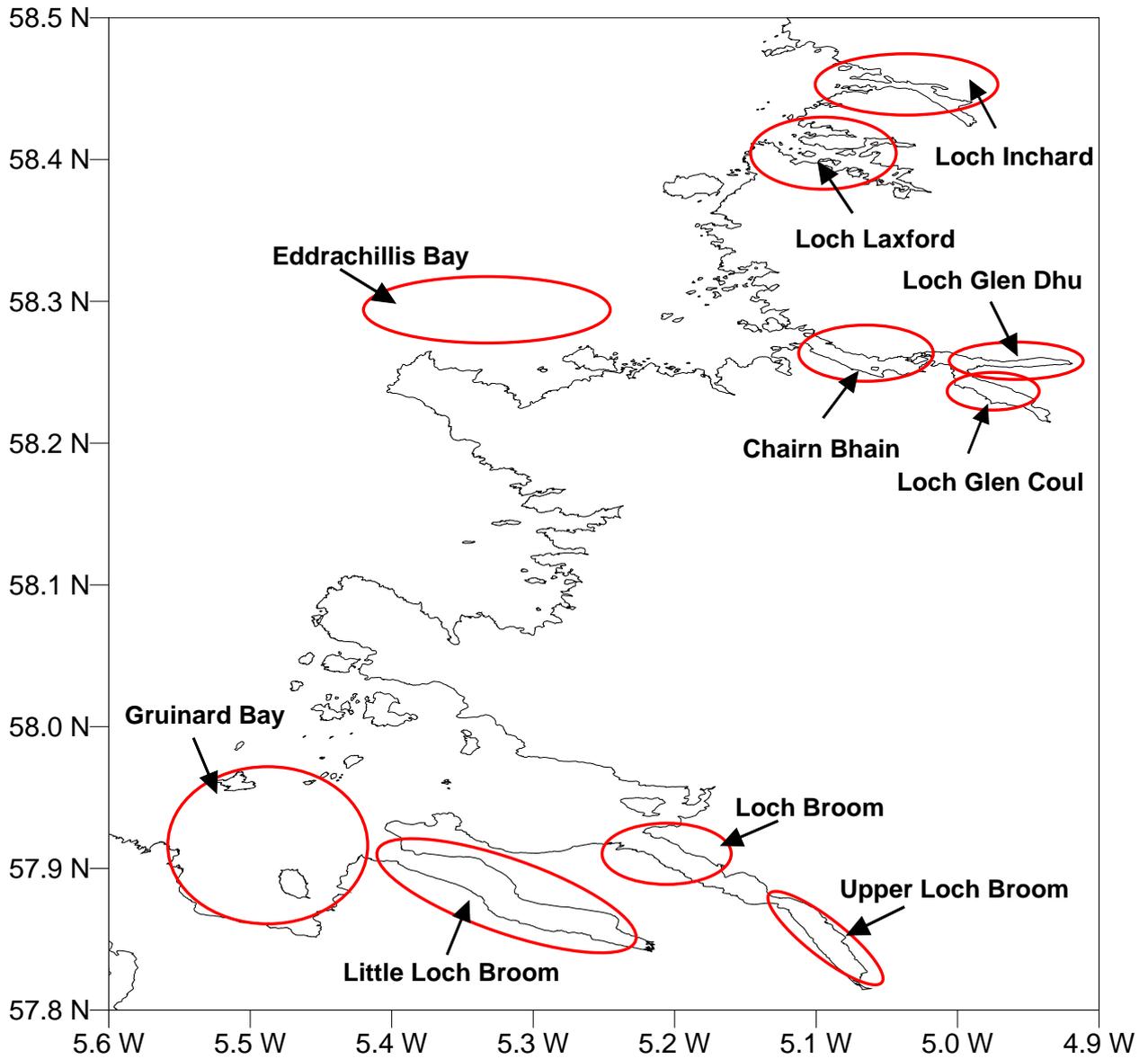


Figure 1: Areas visited on cruise 0110A.

Location	Number of TV stations	Number of Sediment stations	Number of stations where the hard ground boundary was identified	Number of significant observations using UWTV	Number of significant observations when NOT using the UWTV
Loch Inchard	22	20	10	74	4
Loch Laxford	11	11	4	48	0
Loch Glen Coul	8	8	7	52	11
Loch Glen Dhu	6	11	3	34	0
Chairn Bhain	6	6	3	30	17
Eddrachillis Bay	13	9	4	35	14
Loch Broom	20	21 (1 extra sample)	15	97	2
Little Loch Broom	14	15 (1 extra sample)	12	81	4
Gruinard Bay	23	24 (1 extra sample)	10	117	11
Totals	123	125	68	568	63

Figure 2: Summary of the data collected by area on cruise 0110A.

Completed Stations, 0110A Loch Inchar and Loch Laxford

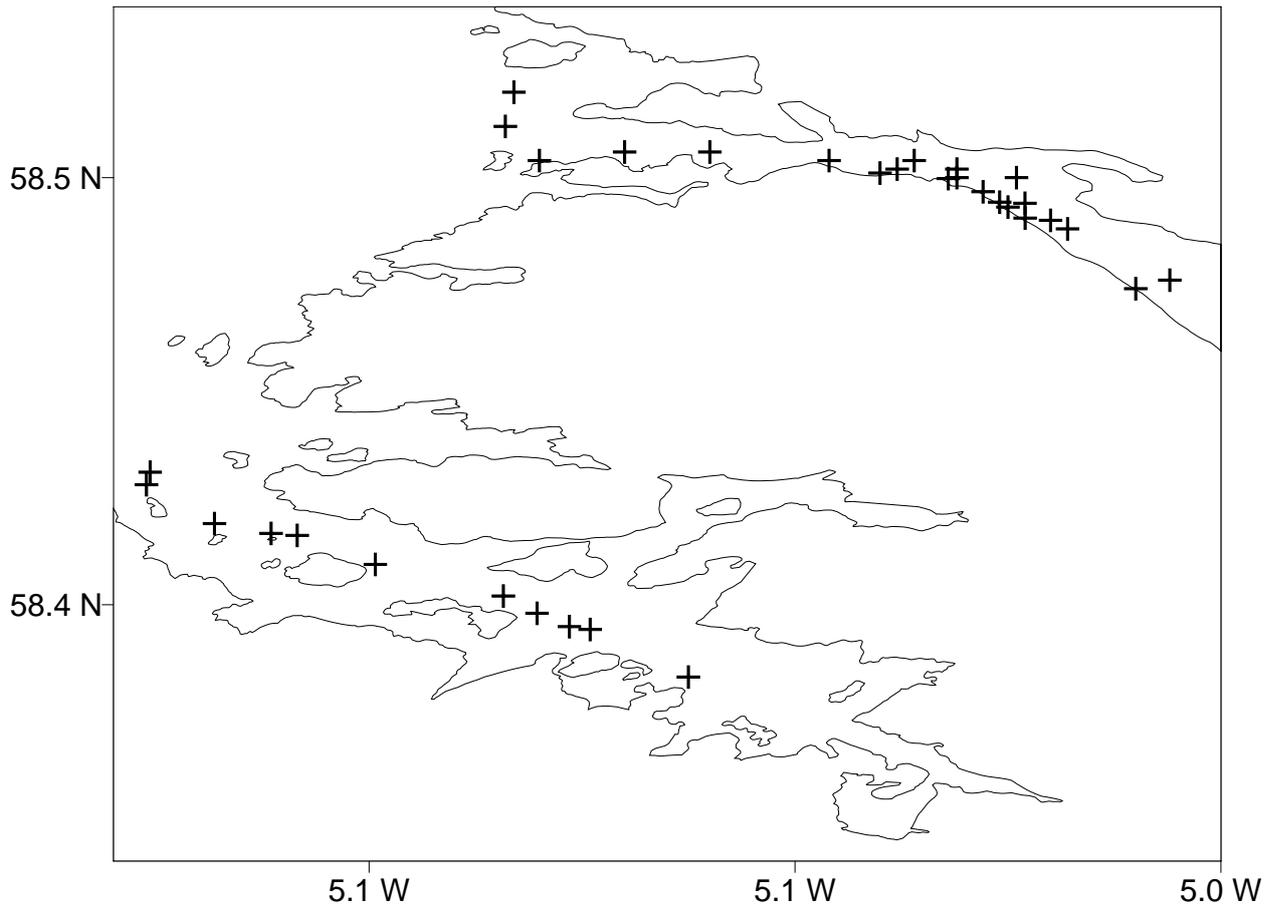


Figure 3: Survey sites in Loch Inchar and Loch Laxford.

Completed Stations, 0110A Chairn Bhairn

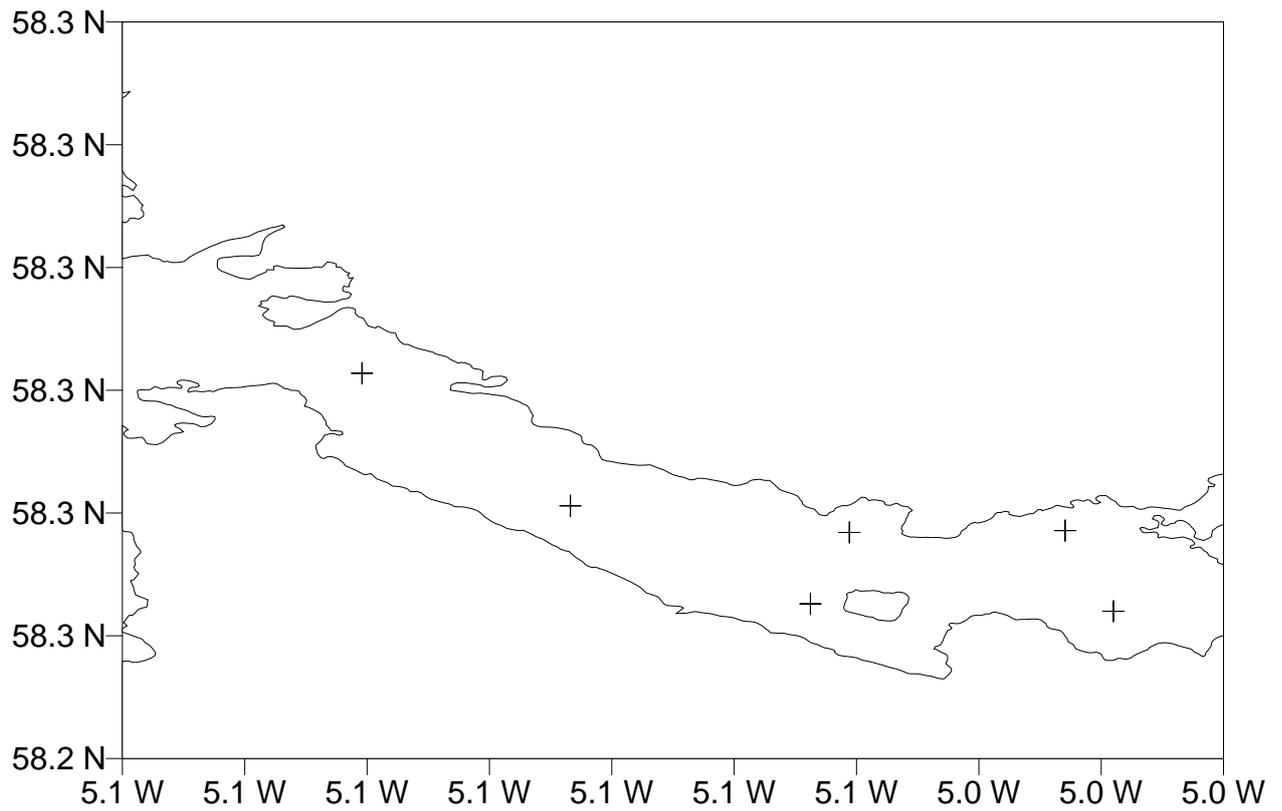


Figure 5: Survey sites in Chairn Bhairn.

Completed Stations, 0110A Loch Glen Coul and Loch Glen Dhu

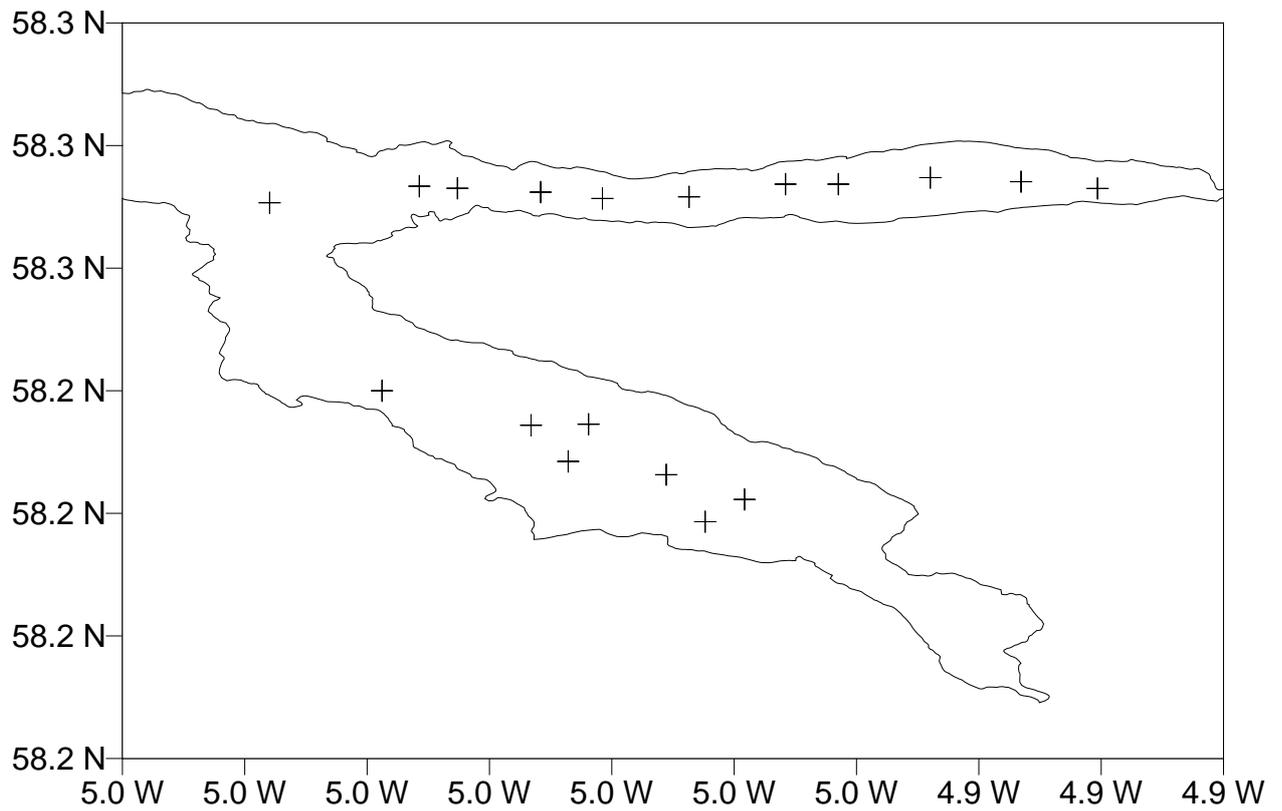


Figure 4: Survey sites in Loch Glen Coul and Loch Glen Dhu.

Completed stations 0110A Eddrachillis Bay

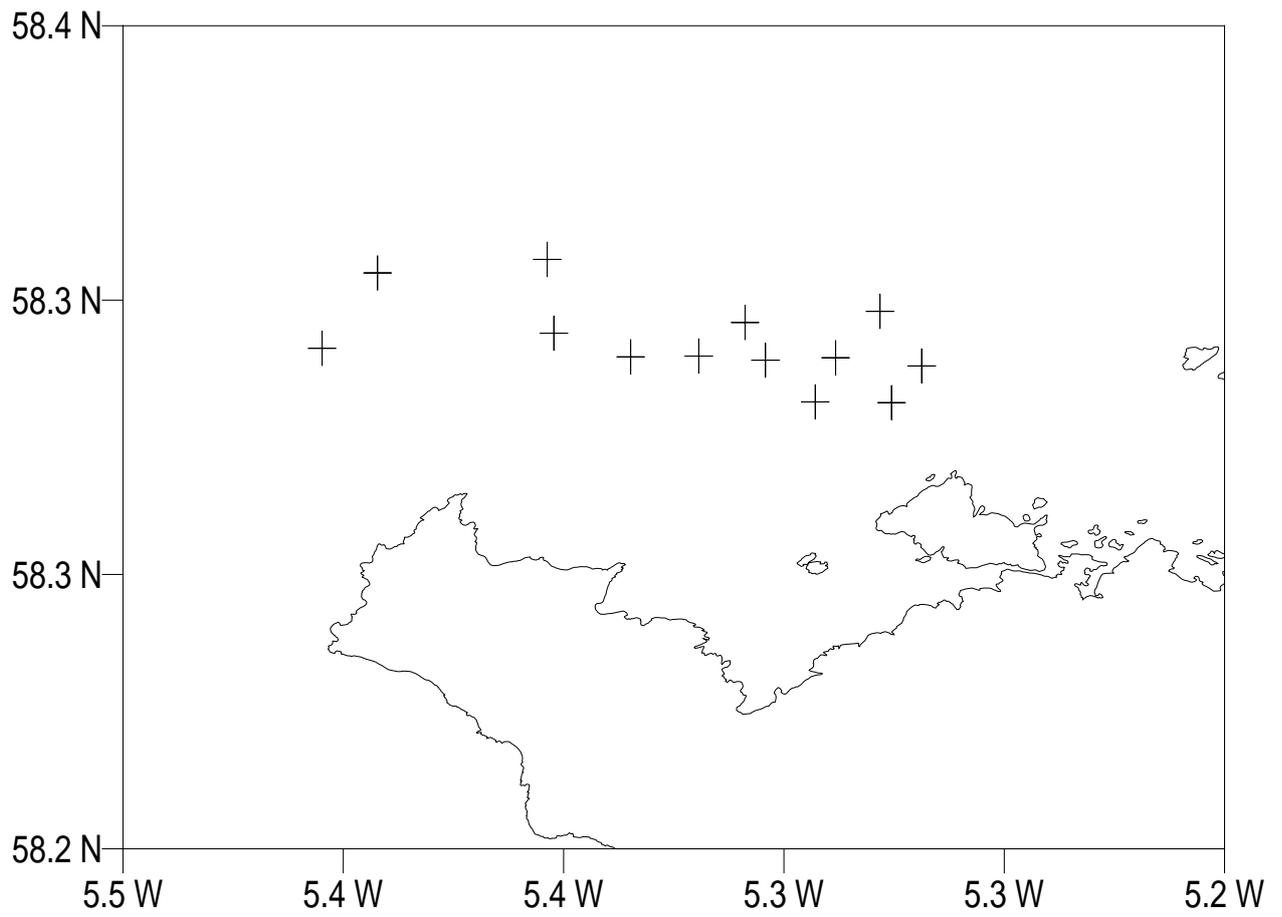


Figure 6: Survey sites in Eddrachillis Bay.

**Completed stations, 0110A
Little Loch Broom and Loch Broom**

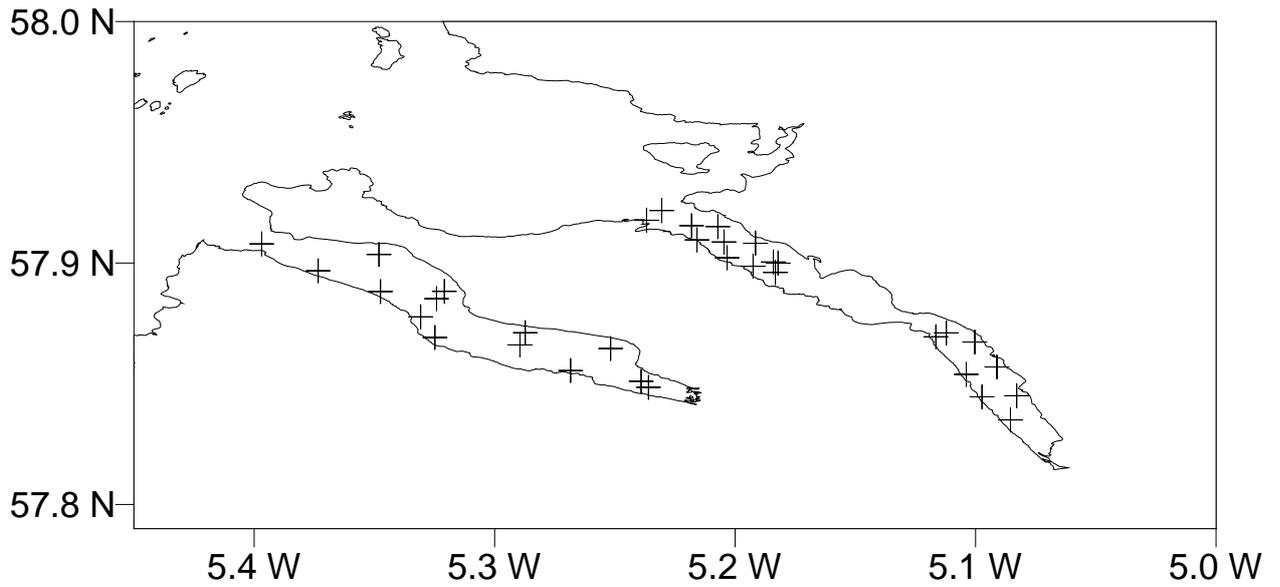


Figure 7: Survey sites in Loch Broom and Little Loch Broom.

Completed stations, 0110A Gruinard Bay

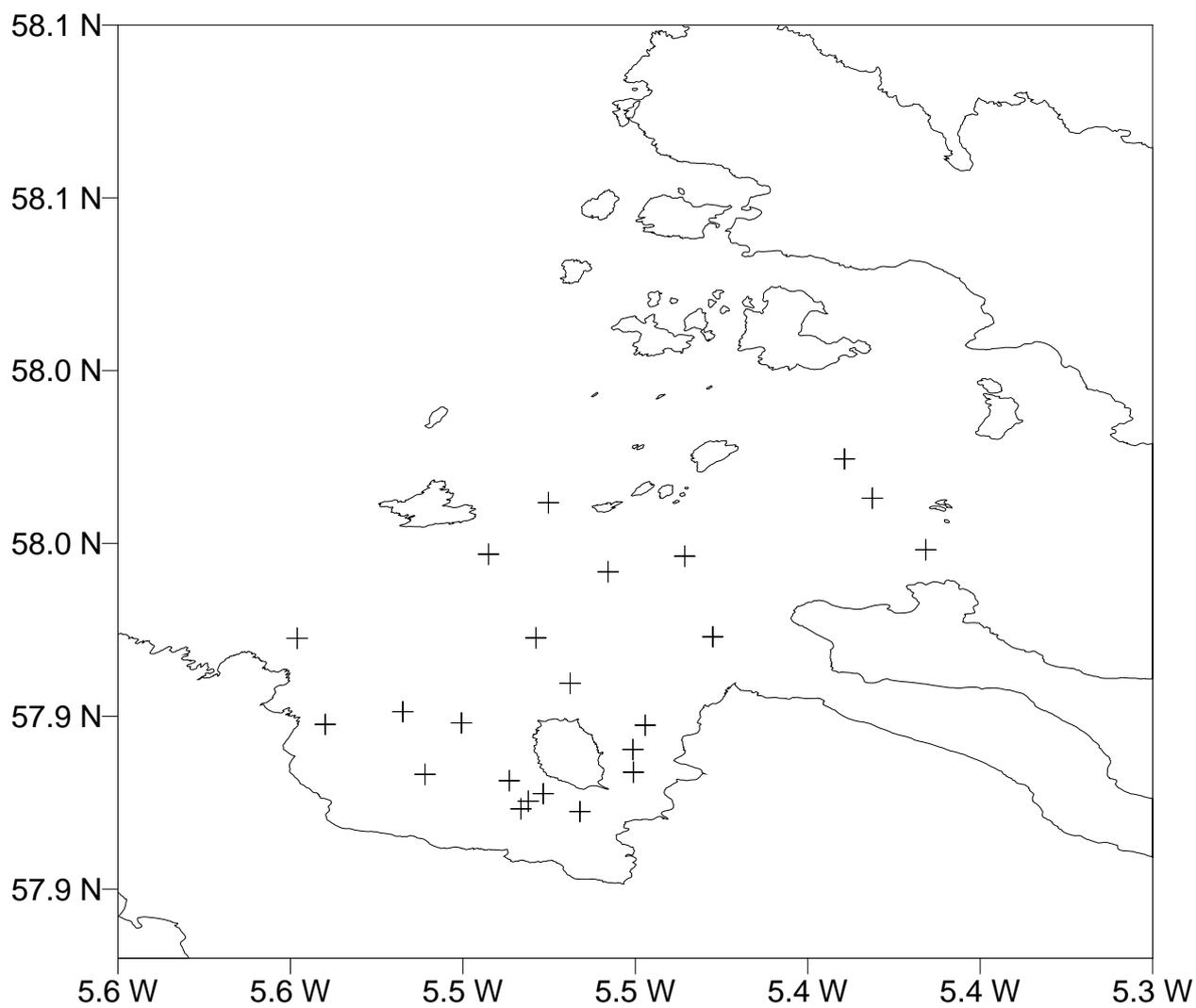


Figure 8: Survey sites at Gruinard Bay.

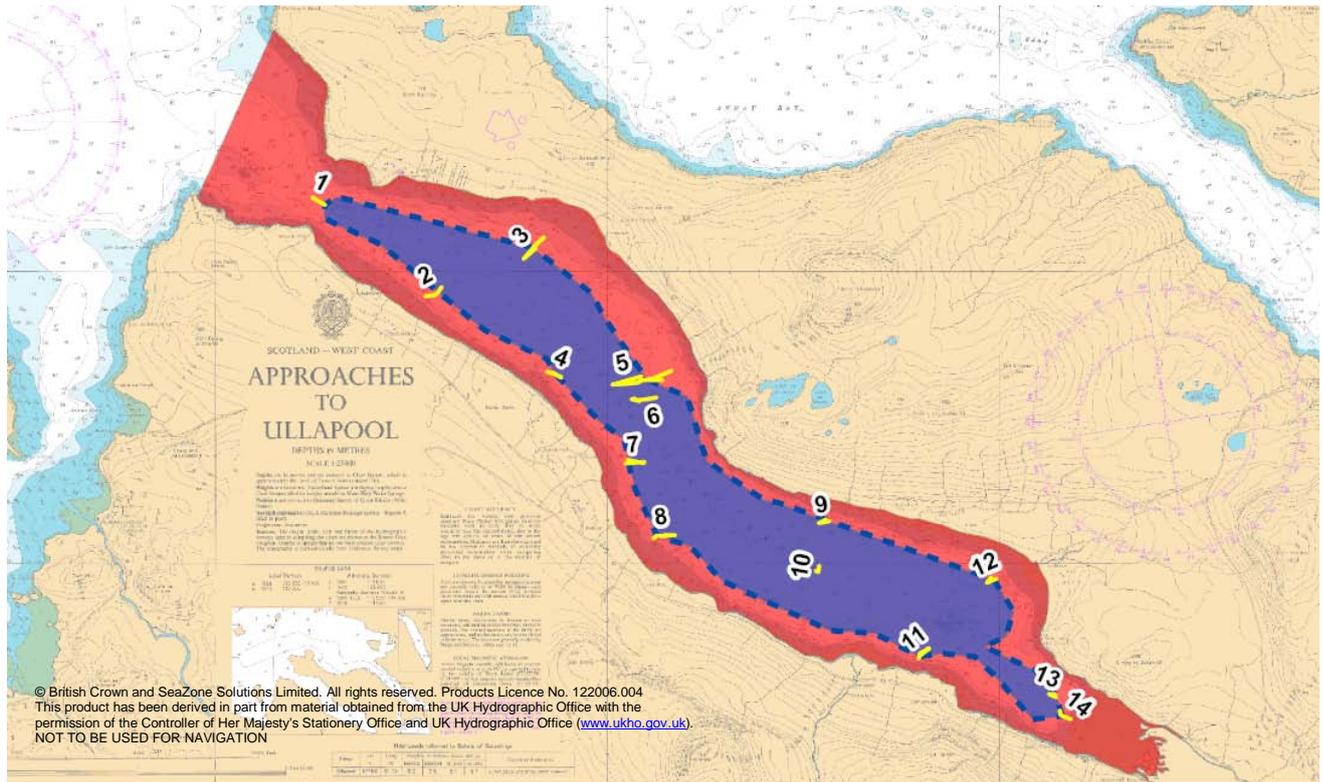


Figure 9: Data from Little Loch Broom plotted using GIS. This shows the track of each tow (yellow), the surface volume of water within the loch (red) and the surface area of suitable muddy sediment as derived from data gathered on this cruise.