Department of Agriculture and Rural Development (Northern Ireland)
Agriculture and Environmental Science Division

Cruise Report: LF 2703
Vessel: RV *Lough Foyle*
Date: 28th June – 4th July 2003
Area: ICES areas VIIa (North) & VIa
Survey Type: N Ireland Multibeam and Minch Survey Part 2

Personnel:

B Stewart (SIC)	DARDNI
C Brown	SAMS
M Roberts	SAMS
C Harper	Fathoms
A Mitchell	QUB
G Saunders	SNH

Objectives:

i. To assess the utility of the RV Lough Foyle as a platform for multi beam sonar.

ii. To carry out multibeam survey of key features in the N Channel and around Rathlin Island.

iii. To survey Stanton and Blackstone Banks.

iv. To survey Mingulay, west of Skye and Rum/Eigg sites in the Minch for the presence of deepwater coral, *Lophelia pertussa.*

Cruise Narrative:

Saturday 28 June 2003
Following changes in scientific personnel the vessel departed Dunstaffanage pontoon at 1230 hrs and sailed towards the ridge feature east of Mingulay. Ship speed was limited to 8 knots to avoid disturbing the multibeam transducers mounted on the bow. The weather was bright and dry with only light winds as the vessel cleared the Sound of Mull. At 1400hrs the scientific party met to discuss a cruise work plan. It was agreed that C Fathoms would work overnight on multibeam acquisition and generate bathymetry grids thus providing information to target ground truthing. The remainder of the afternoon was spent preparing the two camera systems. The SAMS Bowtech video camera was mounted on a drop-frame to view the sea bed from above while the DARD video and stills cameras were mounted on a sledge for towing along the seabed.

The vessel arrived on site at 2030 hrs when eventually a CTD cast was taken to provide velocity of sound measurements. This information enabled a multibeam survey across the ridge feature east of Mingulay, where *Lophelia pertusa* was previously observed, to commence at 2155 hrs. The day ended in calm conditions with a spectacular sunset as the vessel began steaming along east west grid lines separated by 200m and parallel to the contours.

Sunday 29 June 2003

The multibeam survey of the first station, Mingulay 01, was completed at 0600hrs and a gridded output was available by 0630hrs. Six areas of interest for ground truthing were identified from the bathymetry grid.

Mingulay 1a: 'Ridge', 56^0 49.9626N 07^0 25.4478W, Depth 80m
Mingulay 1b: 'Ridge', 56^0 49.3650N 07^0 25.4346W, Depth 85m
Mingulay 1c: 'Uneven seabed', 56^0 49.4166N 07^0 23.8242W, Depth 120m
Mingulay 1d: 'Deep area off ridge', 56^0 49.3200N 07^0 26.0778W, Depth 200m
Mingulay 1e: 'North of ridge', 56^0 50.3383N 07^0 25.0782W, Depth 108m
Mingulay 1f: 'SE flank of ridge', 56^0 49.7778N 07^0 24.8352W, Depth 110m

At 0800hrs the drop down video camera was deployed to record seabed images at station 1a. After a few minutes and following continual tripping of the power supply the camera was recovered to find that a small amount of water had leaked into a connector. Having secured the connector the camera work was restarted at 0913hrs and within a few minutes the first sighting of *Lophelia pertusa* was logged at depth 116m. Other conspicuous fauna included dense aggregations of crinoids (likely to be *Antedon bifida*) colonising many varied sized boulders and cobbles. However, difficulties in positioning the vessel prevented the first video inspection at Station 1a from recording the fauna at the top of the ridge. At 1010hrs the camera was recovered so the ship could manoeuvre back towards this site. Video recorded started again at 1111hrs, revealing again a hard substratum with some areas colonised by considerable hydroid growth and dense areas of small white actinians or zoanthids. Seven *Lophelia* sitings were made in the first hour and a half. The vessel drifted S to SW allowing the camera run to move from Station 1a across to Station 1b. There was some evidence for a zonation moving down the flank of the ridge features with some areas being rich in crinoids whereas others supported more sponge species. Dead coral rubble across the seabed was first sited at 1229hrs. It was seen for the remainder of the survey but its' distribution was distinctly patchy. At 1314hrs the survey was completed. Undoubtedly the drop-frame camera inspection benefited hugely from the calm sea conditions.

Site 1c, the area of seabed identified as having a distinct 'lumpy' appearance from the gridded multibeam survey was the next ground-truthing target. The camera was lowered to seabed and recording at 1405hrs. However increasing interference on the video and intermittent system tripping meant that the cameras had to be brought back to the surface. Following this, one of the light connectors was sealed with self-amalgamating tape and the camera redeployed. However, a strong tidal stream prevented the drop-frame from descending vertically and the ground-truthing camera work was put on hold. To substitute, Day grab sampling the coral rubble commenced as part of the continuing cruise work plan. Ten grab shots were completed with six

recovering some sample of the hard substratum. Of the six grabs containing a sample, three contained coral rubble and associated fauna. Grab sampling was completed at 1752hrs and preparations for the second multibeam survey, Mingulay 02 began with a CTD cast at 1833hrs. The multibeam survey itself started at 1857hrs. Work for the second day finished at 2139hrs as he sun dipped beneath the horizon between Mingulay and Bernaray.

Monday 30 June 2003

Multibeam surveys of Mingulay station 2 were completed at 0101hrs and followed by a CTD cast in preparation for the multibeam survey at station 3. This survey started at 0203hrs and was broken off leaving two or three lines to be completed in favour of ground-truthing. It was planned to begin with side scan sonar across the 'lumpy' area of seabed identified at Mingulay station 1. By 0730hrs the towfish was in the water but although it was transmitting, no data was received. On closer examination the fish was found to contain a few mussel shells, so it seems that the collision it had suffered last week may have been the source of the problem. Given this, a switch was made to visual ground-truthing with the SAMS drop-frame camera. This was launched and the video was recording on the seabed by 0804hrs. Coral and coral rubble was recorded at this station in shallower areas along with sediment and large sea anemones at the deeper portions. However, the shallowest portion where it was hoped live coral would be seen was missed in this deployment. The camera was brought back on deck at 0826z to allow the vessel to reposition for another deployment along the same track.

The second camera drop of the day at Mingulay 1c began at 0907hrs and by 0923hrs it was clear that this area was heavily colonised by sizeable *Lophelia* colonies, several metres across. Areas of live coral were interspersed with areas of coral rubble, boulders and sponges. As the camera ran across to deeper areas distinct zones were seen, from live coral (mostly seen at between 116 and 144m), to dead rubble, seabed with frequent large ophiuroids, *Pachycerianthus* and eventually into burrowed sediments at almost 200m (*Nephrops* and *Calocaris*). Clearly this area still supports a viable cold-water coral reef. The camera drop ended at 1020hrs. During this camera deployment, the DARD video and stills cameras were transferred from the towed sledge to the drop-frame. Once completed this DARD drop-frame was deployed at 1150hrs over the same area, 1c, to further ground-truth and collect still images of the reef. While the images allowed the seabed to be seen, the video camera was too distant from the bottom to allow the gear to be flown effectively over the rough seabed.

In addition the stills camera flash failed to operate. The camera drop confirmed a similar zonation to that recorded in the previous deployment. When recovered at 1259hrs, it became clear that the stills camera had taken pictures but sadly the flash was not operating. At this stage the sidescan was prepared for deployment once again, since damp connectors had been located and subsequently dried. Unfortunately more problems with the sidescan were found. A cable above the fish was damaged and had leaked. The sidescan survey was abandoned for the day to give this an opportunity to dry.

Camera ground-truthing began again at site Mingulay 1d, a deeper, off ridge area. The SAMS drop-frame camera was used to allow adjustments to be made to the DARD

system by lowering the video and stills camera closer to the bed and investigating the recalcitrant flash gun. The drop-frame was deployed at 1402hrs. This area again showed dense crinoids, some coral rubble and areas of a spectacularly high density of erect sponges attached to a rocky and boulder-strewn substratum. The final ground-truthing of the day operation was conducted at Mingulay site 1e, an area north of the ridge. The adjustments to the DARD drop-frame allowed a much clearer image of the seabed, but sadly the stills flash was not operational.

Depths during this deployment varied from 110 to 178, with heavily burrowed sediment in the deeper portions and boulders and crinoids dominant in the shallower areas. The camera deployment was ended at 1826hrs to allow time for the vessel to steam towards Castlebay on the Isle of Barra to meet the Boy James, a small launch chartered to bring out 5 litres of concentrated formalin sent across on the Clansman ferry from Oban. The two vessels met at 1930hrs and the formalin was transferred. The Lough Foyle then set out towards the next multibeam station, a site selected east of the Mingulay working area. Survey at this station, Mingulay 4, began at 2140hrs, following a CTD cast.

Tuesday 1 July 2003

Multibeam survey of Mingulay station 4 was completed at 0700hrs to allow the daytime ground-truthing campaign to begin. This was planned to start with Mingulay station 2 using the DARD drop-frame camera system. During the transit from Mingulay station 4 back to station 2, the DARD sidescan was tested by lowering into the water. Once again the tow fish was not functioning and any hope of using the sidescan sonar during the MINCH cruise had to be abandoned. The ground-truthing targets for camera deployments at Station 2 were selected to cross NE of the prominent ridge on the multibeam survey and identify smaller features visible on the bathymetry (sites 2a, 2b).

Further sites were selected to cross the ridge in the middle of the site (2c) and the top of the ridge (2d). Unfortunately the strobe for the stills camera was not functioning but the camera was still deployed with the aperture opened by one stop. After just over 10 minutes on the bottom it was clear that the illumination was extremely poor, the drop-frame was unstable and the deployment was abandoned. Operations were then shifted to Day grab sampling through three sites across the Mingulay Reef area. A total of twelve grab shots were completed with varying degrees of success on the hard substrata. A number of grabs recovered coral rubble and in one a sizeable section of epifaunal-rich dead coral skeleton was recovered. These were preserved in the formalin that was delivered yesterday.

Given the success of the Day grab sampling the SAMS cameras were prepared above a Van Deen grab. This video grab was intended to target live coral sampling. Sadly this proved impossible since any application of power to the two lights caused the camera unit trip switch to close. It appears that the umbilical had become damaged and advice from the engineers at SAMS was sought. In the meantime, video-grabbing was impossible and the DARD towed video sledge was deployed to ground truth across the Mingulay station 2. On its first deployment it quickly became clear that the illumination was still far too low. The sledge was recovered to allow the two lights to be exchanged for a single spotlight. This operation took half an hour and by 1519hrs

the sledge was on the bottom recording a rocky and boulder-strewn seabed colonised by many erect sponges. After 26 minutes on the bottom the camera run ended. Two further towed video deployments were completed before the ground-truthing moved on to Mingulay station 3. Here two camera tows were made to cross the steep-sided escarpment prominent on the multibeam survey. The first deployment was cut short when the video cable slipped along the tow cable and appeared close to the bed in the field of view of the camera. When restarted, the ground-truthing revealed a rock and boulder/cobble covered seabed with areas of possibly morainic material interspersed with flat, relatively featureless seabed. There were very distinct boundaries between these seabed faces. Areas of erect sponges, crinoids and zoanthids once again dominated the visible fauna. Ground-truthing was completed at 2101hrs and following a CTD deployment, multibeam survey restarted at 2145hrs. The targets of the multibeam survey were to complete the survey of Mingulay station 3 before moving on to survey Mingulay station 5. Once again the daylight activities drew to a close following a day of calm seas and bright sunshine as the Lough Foyle enjoyed a fourth day of fine weather.

Wednesday 2 July 2003

The remaining multibeam survey lines at station Mingulay 3 were completed at 0030hrs and following a CTD cast at 0058hrs, the multibeam survey of the final Mingulay station, number 5 started at 0141hrs and ran until 0645hrs. Data gridding revealed some areas of topography similar to the reef topography seen at the first Mingulay station. The camera sledge was deployed to ground-truth the northern portion of the of the Mingulay 5 survey area that closely resembled reef topography. The video sledge was deployed and ground truthing commenced at 0809hrs, revealing now familiar crinoids and small boulders. This gave way to coral rubble and at 0819hrs sizeable live coral colonies were in view. To limit any damage to the reef, the camera sledge was recovered and was back on deck at 0831hrs.

The Lough Foyle then set off to the southern area of Mingulay 5 accompanied by a pod of 20 or 30 common dolphins on the bow. The sledge was deployed ahead of a potential reef area at 0917hrs reaching the seabed at 0949hrs. After losing contact with the seabed for a short while the ground-truthing run continued across burrowed sediment, with occasional rocks and the spectacular *Pachycerianthus* sea anemones. Coral rubble was sighted at 1024hrs and shortly afterwards the first live *Lophelia* came into view. Again sizeable colonies were seen and to limit any damage, the camera was lifted from the seabed at 1034hrs. Given the video information that these areas seabed contain live reef, the northern area was grab sampled using the Day grab. A total of 11 grab shots were taken, 8 of which contained dead coral rubble and one contained three intact erect sponges. Of these, 8 grab hauls were sieved through 1mm mesh and preserved in 4% formalin. Grab sampling ended at 1357hrs and the Lough Foyle began steaming for Mingulay station 4 at 1400hrs.

This additional station, to the east of the others was then ground-truthed using the camera sledge. Two short camera tows were made to the north and south of the multibeam survey area. The northern tow was started at 1520hrs. The seabed surveyed showed many *Nephrops* and *Calocaris* burrows, crinoids and the occasional pennatulid. The sledge run crossed areas of stones, possibly glacial moraines, which were colonised by erect sponges, zoanthids and was home to squat lobsters (probably *Munida rugosa*). This transect ended at 1617hrs and after steaming to the southern

end of the Mingulay 4 multibeam station, the sledge was redeployed at 1706hrs. This last ground-truthing exercise of the day revealed a harder substratum, with greater cover of gravel and cobbles. Again there were many erect sponges colonising this hard substrate. The tow ended after half an hour to allow the transit to the second working area, the west of Skye, to begin at 1800hrs. Once again the weather remains remarkably kind. A lower pressure area has moved across but wind speeds remain low and as with the last two days, there remains virtually no detectable swell. The estimated time of arrival at the survey areas to the west of Skye is 0100hrs, tomorrow.

Thursday 3 July 2003

Today's activities at the west of Skye site began with a CTD cast at 0014hrs followed by the start of the multi-beam survey at 0027z. The survey, chosen from digibath output to target the steepest slopes, was successful until 0630hrs when a series of errors were generated by the multibeam system. The system was restarted to no avail and after checking all connections above the water line it became clear that advice from Simrad engineers was required. To allow ground-truthing to begin, the overnight multi-beam survey was processed and a series of three camera tows was selected:

1. Northern site, targeting steep topography
2. Mid site, targeting steep topography
3. Southern site, targeting linear features (possibly scour marks) that run approximately south to north.

The first camera tow began at 0906hrs and revealed seabed varying from gravely sand to scattered rocks and what appeared to be bedrock. No evidence for coral communities was seen but some of the boulders and cobbles were colonised by erect sponges. The second camera deployment again showed a seabed covered by gravel and small stones. During the deployment, the camera drifted to shallower waters where larger rocks and boulders were common and extensive areas colonised by plumose sea anemones (*Metridium senile*) were seen. The final camera tow of the day, across the features tentatively identified as scour marks on the multibeam record, began at 1412hrs. During the tow the camera sledge passed areas of initially soft mud burrowed by *Nephrops* before moving to areas strewn with cobbles and small rocks. Many of the small rocks appeared to be colonised by cup corals (probably *Caryophyllia smithii*). It seems likely that the lineations seen on the multibeam record correspond to these areas of alternating harder and softer substrate.

The camera tow was completed at 1531hrs and by 1542hrs the Lough Foyle was steaming for the final survey area of the cruise, the site between the islands of Rhum and Eigg with an estimated time of arrival 2230hrs. Work between Rhum and Eigg began at 2240hrs with a CTD deployment after which the multibeam survey was started at 2305 following the steep contours by the Rhum shore.

Friday 4 July 2003

Once the multibeam survey and calibrations had been completed at 0545hrs, the data were gridded so that ground-truthing sites could be chosen. As at Skye, three sites were selected:

1. Ridge features located beyond the 100m contour and unmarked on the Admiralty chart or digibath (56º 56.36N 06º 14.90W, approx 120m).
2. An area with steep topography towards the SW corner of the multibeam survey area (56º 56.48N 06º 16.20W, approx 90m).
3. A second area of steep topography (56º 56.90N 06º 15.05W, approx 100m).

The first tow started at 0658hrs and lasted for just under one hour. Beginning on soft mud with frequent Nephrops and Calocaris burrows, the tow crossed areas of shell, sand and bedrock colonised by cup corals (probably *Caryophyllia smithii*). The second tow again began in soft, burrowed mud but climbed the steep topography showing initially rocks on silty sand then bedrock colonised by crinoids and cup corals. The final camera tow of the cruise started at 1015hrs. Once again the start of the line revealed a burrowed muddy seabed. After a brief break to avoid kreels marked on the surface the tow continued across similar seabed, broken with the occasional rock, sometimes colonised by *Metridium senile*. The camera was recovered and on deck at 1045hrs and the Lough Foyle began the transit to the final working area, the SAMS artificial reef site in Loch Linnhe. The vessel arrived at the SAMS site at 1610hrs when the CTD was deployed. The multi-beam survey commenced at 1620hrs and was completed at 1645hrs. Gridded data identified positions of the artificial reef material. The survey work concluded the vessel sailed to dock in Dunstaffanage at 1800hrs.

Hotel Report & Operational Aspects of the Ship:

During the cruise the A-frame, main trawl winches, both hydrographic winches and the ship's clean seawater supply were used. No problems were encountered with any of the ship's equipment nor indeed with any of the scientific equipment. The hotel and catering service was of the usual high standard and there was a good working relationship between the scientists and the ship's crew. Prior to the ship departing both Belfast and Dunstaffanage a comprehensive and detailed safety briefing was delivered to the scientific crew.

Acknowledgements:

I am indebted the deck crew of the RV Lough Foyle for their co-operation and assistance throughout the survey cruise. The ship's master, officers, engineers and catering staff are also thanked for their co-operation during this cruise.

Special thanks are due to Dr. Murray Roberts (SAMS) for his valued input to the preparation of the LF 27 2003 cruise report.

B M STEWART

7 July 2003