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MRV *Scotia*

Survey 0612S

REPORT

25 May – 13 June 2012

Loading: Aberdeen, 22 May 2012
Sailing: Aberdeen, 25 May 2012
Half landing: Greenock, 5 June 2012
Unloading: Aberdeen, 13 June 2012

Personnel

A Weetman (SIC)
L Allan
J Hunter
M Inglis
G Jones
C Mesquita
C Shand
A McLay (5-13 June 2012)

Out-turn days by project: 9 days RV1204 20088 (North Sea)
11 days RV1205 20089 (West Coast)

Gear

2 x Scotia BT175 60mm prawn trawls (one with 8" hoppers)
2 x Day grabs and 1 x sieving table
Towed UWTV sledge and the UWTV drop frame (larger version)
2 x 600m umbilical towing cables and associated TV equipment (including back up)

Objectives

1. To obtain estimates of the abundance and distribution of *Nephrops* burrow complexes at Fladen, in the North Minch, the South Minch, the Firth of Clyde and at Devil's Hole. If time and weather permits, stations in the Sound of Jura and the Noup may also be surveyed.

2. To use the TV footage to record the occurrence of other benthic fauna as well as evidence of commercial trawl activity.

3. To collect sediment samples at each station.

4. To carry out trawling for *Nephrops*, based on one haul in each sediment stratum in each of the main survey areas, to obtain samples of *Nephrops* for size composition analysis.

5. To collect samples of *Nephrops* for comparison of reproductive condition and morphometrics in each of the different survey areas (functional units).

6. To collect samples of *Nephrops* stomachs for evidence of the parasite *Stichocotyle nephropis*).

7. To carry out environmental impact sampling in and around the Elgin gas field. This will include water samples, sediment samples and trawling using the BT175.

Narrative

Following a slight delay in sailing due to thick fog at Aberdeen harbour, MRV *Scotia* began work in the Southern Trench on 25 May. At this first station 550 m of the TV cable was paid out then re-spooled back on to the winch under tension to avoid loose coils of cable developing later in the survey. This also doubled as a training exercise for the ship and allowed field trials of all the equipment, which highlighted a problem with both the video camera and mini van Veen sediment grab. Both items were replaced *en route* to Fladen later in the day.

With ideal sea conditions work progressed well through the southerly stations in Fladen over the following two days with a trawl on the night of 27 May. The weather changed for the worse on 28 May but this did not hinder TV operations and by 29 May the most northerly stations off Shetland were all completed. Work continued down the west side of Fladen with a trawl in the evening of 29 May and all the Fladen sites were completed by the morning of 30 May.

In idyllic conditions MRV *Scotia* made way through the Pentland Firth arriving at the first North Minch station in the early evening on 30 May. Work continued down the west side of the North Minch before entering the South Minch by mid afternoon on 31 May, where a trawl was carried out later that evening. As the survey continued south towards Barra some stations had to be relocated due to creels and poor visibility on the sea bed. By the evening of 1 June all the sites on the west side of the South Minch had been completed and the vessel started working east, with a trawl later that evening. TV work continued around Eigg, Rhum and Staffa on 2 June before heading for the Clyde, steaming through the night.

On 3 June a route up the west side of Arran was selected, surveying TV sites *en route* before heading in to Loch Fyne, where at a site off Tarbert in very soft mud, the sledge struck an uncharted rock face. Initially the video and lights failed and as the equipment was being recovered it became obvious that the sledge had parted from the cable. With the location of the impact marked on the navigation chart, several attempts to recover the sledge using the trawl were carried out. A total of 12 trawls were executed throughout the remainder of the day over the area where the sledge was lost. This caused a great deal of damage to the trawl, and at 2130 further attempts of recovery were suspended. Any *Nephrops* caught in these recovery trawls were worked up as standard, as catches on this survey are not used to quantify stocks but only to provide biological information. Throughout the day whilst attempting to recover the sledge, alternative options were discussed. This resulted in the half landing date and venue being changed and arrangements for a replacement sledge to be delivered to the vessel were made. Over night the vessel headed for Greenock arriving in the morning of 4 June. Whilst waiting for a berth, the damaged cable was taken off the winch and replaced with the spare TV umbilical. The trawl was also repaired and the TV equipment was set up in preparation for the new sledge arriving on the following day. *Scotia* berthed in Greenock to begin the half landing on the evening of 4 June.

Whilst in port on 5 June the new sledge was set up, tested and all the required measurements were taken. At this time Dr . McLay also joined the vessel for the remainder

of the survey. On the evening of 5 June the vessel recommenced the TV survey, working along the west side of Bute and progressed on to Brodick Bay by the following morning. To remove loose turns on the TV winch that had developed after changing the cables and working in relatively shallow water, the vessel steamed to deeper water where 400 m of cable was paid out then recovered under tension. Work continued through in to the evening, including a trawl as well as TV stations, until early on the morning of 7 June when a fault was reported in the TV cable. After rectifying the problem TV operations continued until midday at which point all the stations in Clyde had been completed.

After a three and a half hour steam the vessel arrived in the Sound of Jura, where all the stations and one trawl were completed by the early morning of 8 June, during which time many sites had to be relocated due to poor visibility. The trawl also experienced extensive damage whilst fishing in this area.

The final South Minch station was surveyed late in the evening of 8 June on the return leg to the North Minch. Work began on the east side of the North Minch beginning at Raasay in the early hours of 9 June and continuing up to Loch Broom by early afternoon. As the vessel now only had one working cable on board, which was also showing reliability issues, it was organised so that a spare cable was to be delivered to Ullapool from Aberdeen. *Scotia* arrived in Ullapool around midday on 9 June and by late afternoon the back-up cable was loaded on to the vessel. TV work resumed in the North Minch through till late evening when a trawl was carried out, after which TV work recommenced. By breakfast the following morning all the North Minch stations had been completed.

At this point *Scotia* headed back through the Pentland Firth towards Fladen, where a final trawl was carried out *en route* to Devils Hole, arriving there on the morning of 11 June. All TV stations and two trawls were completed by late morning on 12 June after which the vessel made way for Aberdeen, spending some time off Stonehaven to allow for the TV cable to be removed from the winch before arriving in port late in the night of 12 June.

Following the conclusion of the debrief and unloading all scientific equipment, Marine Scotland Science staff disembarked at 1300 on 13 June.

Results

The Study Group on *Nephrops* Surveys (SGNEPS) had previously approved the survey design used on this survey. Although the sites at Devils Hole were wholly based on fixed stations, all other areas had stations randomly generated within specific boundaries, in addition to a small number of sites that are fixed in some areas. In the North Minch, that boundary was based on 2010 Vessel Monitoring System data (VMS), where in all the other areas the boundaries were based on sediment strata, limiting the survey to areas of muddy sediment suitable for *Nephrops* habitation as defined by the British Geological Survey (BGS) data. Some of the fixed TV sites in the North Minch appear outwith the VMS boundary, which is illustrated in the plot later in this report

In addition to the survey design, all video footage was collected and reviewed as directed by SGNEPS. Training was carried out ahead of the survey with further assistance provided by an experienced member of staff whilst at sea. All the video footage gathered on this survey was reviewed independently by two members of staff whilst at sea. The data were then analysed and where significant differences between the two reviewer's values were observed, the footage was reviewed a third time. The final results will be used in ICES assessments to help provide management advice for 2013. A summary of the number of stations, trawls and sediment samples by survey area is illustrated in Table 1 below.

Trawling was carried out in each of the survey areas with varying degrees of success. Measurements of length frequency by sex were taken (LFD), as well as maturity stages, morphometric and weight data, summarised in Table 2 below. Maturity data and length frequency information is required by the Data Collection Framework, and the morphometric and weight data will be used at Marine Scotland Science to improve standard historical *Nephrops* relationships within the Fisheries Management Database. The net was cleaned between each of the main geographical areas before a final clean on 12 June. Records of all marine litter collected during each trawl were updated and the data passed on to the MSS coordinator in Aberdeen at the end of the survey.

No digital photographs were taken during this survey. However, images can be obtained from the video footage if required, using Squared 5 software.

A total of 222 sediment samples were taken during the survey, the majority were gathered using the sledge mounted mini van Veen. At one site in the Clyde and one in the South Minch, the substrate was too hard to obtain samples. The samples will be analysed using the Mastersizer 2000 particle size analysis machine (PSA) based at the Marine Laboratory some time during 2012. The results will be used to improve survey design and BGS data.

Whilst at sea all generated data was entered in to various spread sheets in a format suitable to be uploaded directly in to the Inshore Ecosystem's TV survey database. This included: cruise summary; PSA records; haul data; *Nephrops* length frequency distributions; morphometric data; station information for each TV site; video observations for each run and burrow counts.

A total of 911 stomach samples from *Nephrops* were collected on the survey, summarised in Table 3 below. The samples, aggregated in to groups of ten and arranged by carapace length, were stored in ethanol and will be analysed at Aberdeen for the parasite *Stichocotyle nephropis.* Samples from the Clyde were also obtained from the tows undertaken when attempting to recover the sledge. These were not legitimate trawls hence no haul number being assigned.

Work at the Elgin field in the North Sea to observe the impact of the recent gas leak and the following attempts to rectify the situation was postponed until later in the year as work was still ongoing in the area by the energy industry, which would have invalidated any results gathered at this time by MSS.

A Weetman
14 September 2012

Table 1

A summary showing the number of TV stations surveyed, number of fishing tows and sediment samples taken, by survey area, on 0612S.

Area	Number of TV Stations	Number of Fishing Trawls	Number of Sediment Samples
Fladen	70	3	70
North Minch	46	1	46
South Minch	40	2	39
Clyde	40	1*	39
Jura	12	1	12
Devils Hole	16	2	16

*This is a tally of standardised tows, and does not include the sledge recovery tows.

Table 2

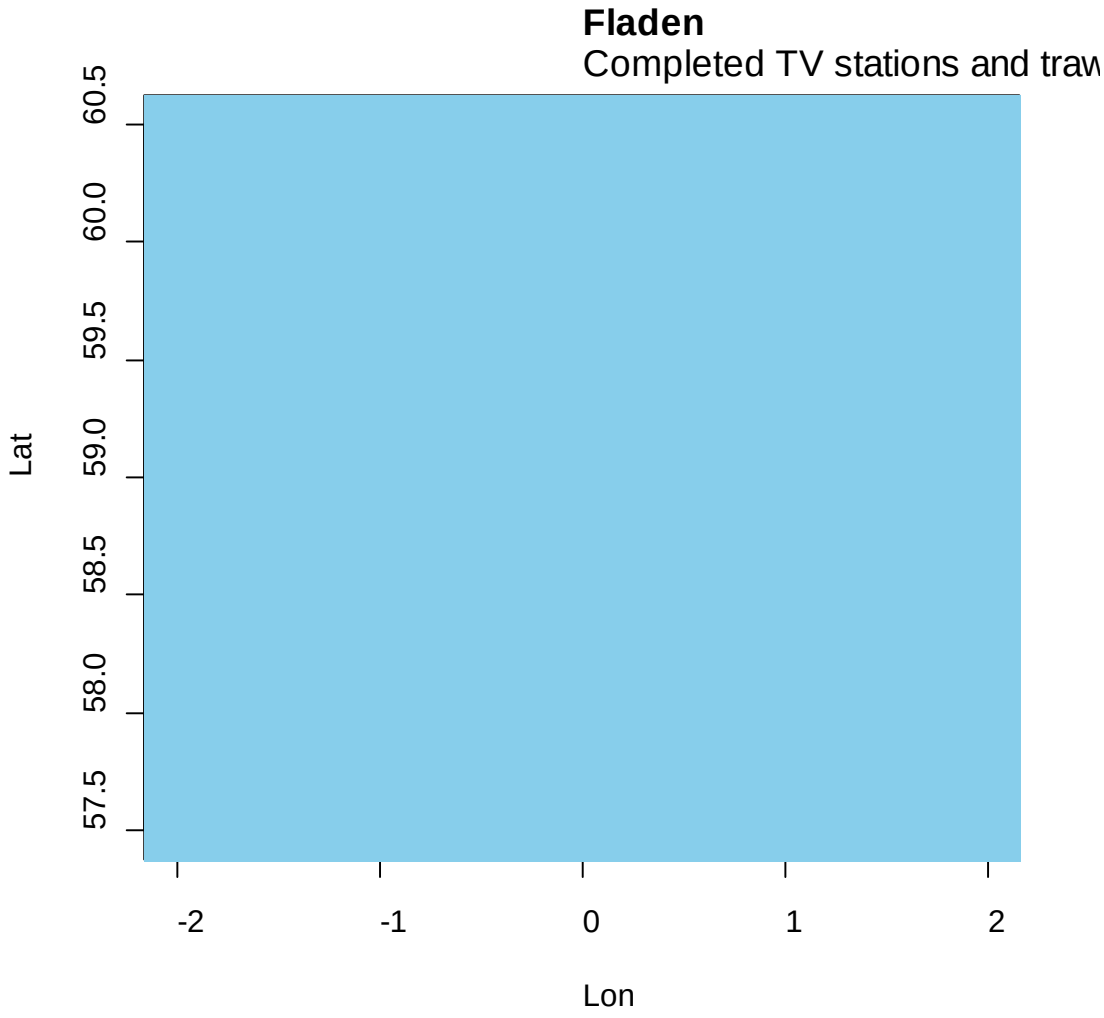
A summary of the trawl data collect on 0612S.

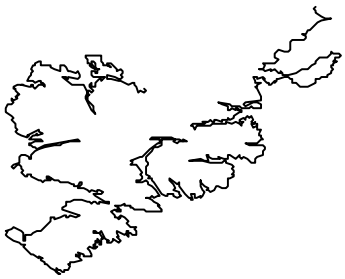
Area	a) Number of *Nephrops* sampled for length frequency distribution	b) Number of *Nephrops* sampled for morphometric measurements	Total number of *Nephrops* measured (a+b)
Fladen	401	79	480
North Minch	405	50	455
South Minch	780	100	880
Clyde	1369	100	1469
Sound Of Jura	97	42	139
Devils Hole	82	31	113

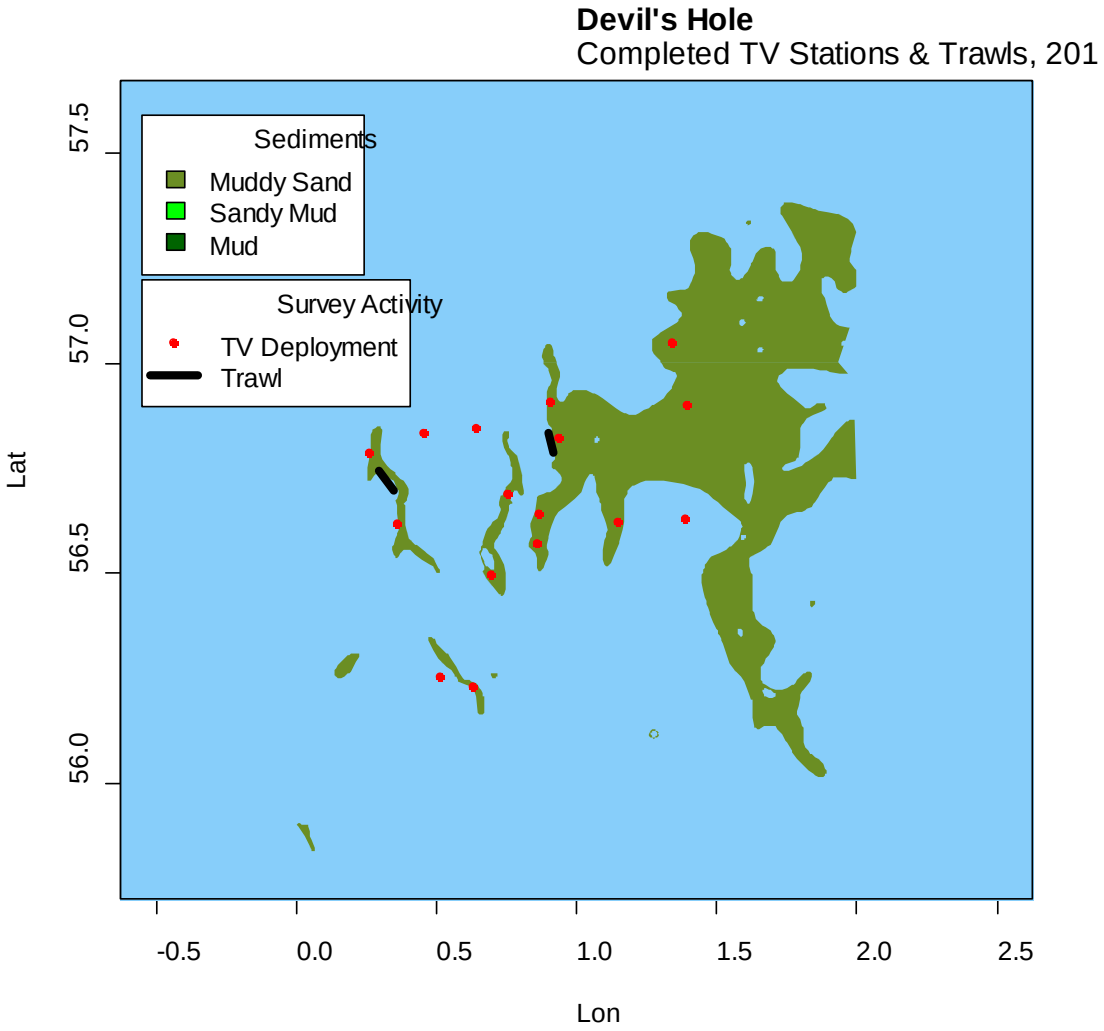
Table 3

A summary of *Nephrops* stomach samples collected throughout 0612S, along with the area in which they were collected from.

Area	Haul	Number of samples
Fladen	S12/252	54
South Minch	S12/254	261
South Minch	S12/255	242
Clyde	Sledge recovery haul	190
Clyde	Sledge recovery haul	164


Fladen
Completed TV stations and traw
Lat
60.5
60.0
59.5
59.0
58.5
58.0
57.5
-2
-1
0
1
2
Lon




Devil's Hole
Completed TV Stations & Trawls, 201
Sediments
Muddy Sand
Sandy Mud
Mud
Survey Activity
TV Deployment
Trawl
Lat
57.5
57.0
56.5
56.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
Lon