

Not to be cited without prior reference to Marine Scotland, Marine Laboratory, Aberdeen

FRV Alba na Mara

Cruise 1309A

REPORT

7-21 August 2009

Personnel

A Weetman SIC (7 – 13 August, 17 – 21 August 2009)

A Tait SIC (14 – 16 August 2009)

C Shand

Ports

Loading: Fraserburgh 3 - 6 August 2009

Sailing: Fraserburgh 7 August 2009

Unloading: Fraserburgh 21 August 2009

Days allocated by project: 15 Days RV0908/10669

Gear

50 mm prawn trawl BT 149B.

Day grab, table and benthic sieves

Towed TV sledge, 600m umbilical towing cable and cameras (plus backup)

TV drop frame

1.7m Light Beam trawl

Objectives

- To obtain estimates of the distribution and abundance of *Nephrops* in the Firth of Forth, Moray Firth and off Arbroath using underwater cameras.
- To use the TV 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 in each of the different survey areas.
- To collect sediment samples at each station.
- To carry out a series of Beam trawls within *Nephrops* grounds in area.

Narrative

All scientific staff were on board FRV *Alba na Mara* by 10:00 on Friday 7 August 2009, and the vessel sailed at 10:30, heading south towards the Firth of Forth, arriving at the anchorage in St. Andrews Bay at 20:30 later that day. On 8 August, the weather was favourable which allowed the vessel to head off to survey the more exposed stations east of

Fife Ness. A trial launch and recovery of the sledge was carried out en-route, which proved successful, followed by 11 stations surveyed for the day, before anchoring off the Isle of May at 20:00. The weather on 9 August remained calm and so heading south east towards St Abbs Head, 2 stations were surveyed en-route, before completing another 6 scheduled stations. With the work progressing ahead of schedule, three additional stations were surveyed in the same area. Although these 3 sites were within the overall boundary of the survey area as defined by the British Geological Survey (BGS.), the method by which these sites were chosen was not based on the standard 'random stratified approach' as defined in the TV survey protocol, but by manually selecting small areas of sediment unsuitable for *Nephrops* habitation within the overall boundary as indicated by the BGS charts. Therefore the results from these three stations may have to be excluded from the final assessment but provides valuable information on the extent of sediment distribution. Once anchored in Pease Bay for the night, a salt water activated laser and reflective plate were mounted on to the sledge. The aim of this exercise was to trial the possibility of electronically measuring the clarity of the water (using Image J software) between the camera and sea bed, as it has been suggested that visibility can have an effect on the accuracy of the burrow counts.

On 10 August Alba headed North West in to the Firth, and by 17:00, nine TV sites had been completed. This was followed by a Beam trawl on *Nephrops* grounds, which in turn was followed by a *Nephrops* trawl over the same ground on which the Beam trawl had been used, so that the contents of each trawl could be compared. Whilst at anchor in Gullane Bay, modifications to the position of the laser and reflective plate were made. On 11 August the Alba continued TV work, heading west towards Musselburgh, then in to the channel towards the Forth Road Bridge, and then back east along the north side of the Firth, covering 9 TV sites for the day. In the evening another Beam trawl and prawn trawl was carried out at the Kingston Hudds, with very different results from the previous tows.

Leaving the anchorage at Methil on 12 August, the final 2 scheduled stations were completed plus a further 6 additional sites, which like the sites generated previously, were manually selected and will help confirm the mud sediment boundary within the Forth. By late afternoon, and with increasing wind strength, both Beam and *Nephrops* trawls were carried out on the Raith Grounds south west of the Isle of May, before steaming to the anchorage off Carnoustie. The weather on the following day was ideal which allowed 3 TV stations within the Arbroath area to be surveyed, before the vessel headed north, arriving in Fraserburgh at 19:30 on 13 August.

On 14 August A Tait took on the role of SIC for the next three days and in moderate sea conditions the vessel completed 9 TV stations up to 18 miles off the land before arriving at Aberdour Bay in the early evening. After leaving the anchorage on 15 August the vessel worked west along the Southern Trench in increasingly poorer conditions. By 16:30 conditions proved too difficult to work in, and with the westerly weather to worsen overnight the vessel headed for the anchorage off Lossiemouth after completing 8 successful and one abandoned TV site for the day. Although variable wind conditions were experienced on 16 August, 9 TV stations were completed as well as 1 beam trawl and 1 *Nephrops* trawl, before anchoring off the North Sutor at the Cromarty Firth. To improve spatial coverage in the area, 3 of the TV sites surveyed on 16 August were in addition to the originally proposed stations.

A further 9 TV stations were surveyed on 17 August, followed by a beam trawl and *Nephrops* trawl, anchoring at Portmahomack at 19:30.

On 18 August, 3 stations were surveyed to the north of Tarbat Ness, and then the vessel worked east, completing 5 more stations before anchoring in Cullen Bay at 20:00. Working some way off to the north of Cullen on 19 August, and in amongst commercial trawlers fishing for squid and *Nephrops*, 8 TV sites were surveyed, 1 beam trawl and 1 *Nephrops* trawl were carried out before returning to Cullen Bay at 19:30.

Working east en-route to Fraserburgh on 20 August, only one TV site could be surveyed before the south easterly swell and high winds proved too rough to continue TV operations. By moving inshore this allowed the trawls to be cleaned by streaming them for 30 minutes each. Following this, the vessel headed for port, arriving in Fraserburgh at 14:30; and in the calmer conditions of the harbour, all the scientific equipment was packed away, and the work areas were cleaned.

Following the debrief and unloading of the vessel, the scientific compliment left Alba-na-Mara at 11:00, on 21 August.

Results

The number of TV sites surveyed exceeded expectations. The additional sites were selected as described in the narrative, to compliment and enhance the survey. Due to these sites having been chosen in a non-standardised manner, they may not be valid for standard assessment purposes but they will provide valuable comparative and supportive data.

58 of the video recordings were verified at sea, and the reminder will be completed on returning to Aberdeen and in time for the annual Working Groups, where the data will be assessed and abundance values provided. In addition to the number of *Nephrops* burrow complexes observed in each ten minute run, data have been collected on *Nephrops* emergence, other observed benthic fauna, sediment type, water clarity, fish species, and any indications of trawling.

Area	Scheduled TV Stations	Additional TV Stations	Total
Firth of Forth	39	9	48
Arbroath	3	0	3
Moray Firth	40	12	52
Total	82	21	103

Using the sledge mounted mini van Veen grab, and occasionally the vessel operated Day Grab, sediment samples from all 48 surveyed sites in the Firth of Forth were collected. The survey failed to obtain one sediment sample in each the Moray Firth (51 samples) and at Arbroath (2 samples) due to the rocky nature of the sea bed. All samples were frozen and returned to the Laboratory, where Particle Size Analysis will be carried out on them, and the results incorporated in to the database from where future analysis can take place.

For the first time on a Marine Scotland-Science *Nephrops* TV survey, beam trawling was carried out in conjunction with traditional *Nephrops* BT149 trawling. This was instigated in response to a discussion held at SGNEPS (held in Aberdeen, February 2009). Dr R. Briggs (Department of Agriculture and Rural Development (Northern Ireland)) has carried out combined *Nephrops* TV and Beam Trawl surveys since 1997, to study the megafauna present on *Nephrops* grounds (which often create burrows alongside *Nephrops*) which is unavailable from commercial bottom trawling; which unlike beam trawls, tend to capture only non-subsurface samples.

On this survey, a 1.7m wide light beam trawl was used that had a 20mm cod end. This was towed for 15mins, and carried out three times in both the Moray Firth and the Firth of Forth. The location of the tows were selected to be on known commercial *Nephrops* grounds; where there was sufficient tow length so that the tow remained on similar sediment type throughout the trawling period; and it was possible to then carry out a traditional BT 149 *Nephrops* trawl over the same grounds, observing the same criteria as the beam trawl. The table below (Figure 1) illustrates the variety of species caught, and combined with the box

plot (Figure 2) highlights the different composition of the beam trawl contents between the two firths.

Trawling for *Nephrops* samples using the BT149 was carried out at three locations in both the Firth of Forth and the Moray Firth. Catches of *Nephrops* in the Firth of Forth ranged from 1.7kg to 5.9kg; and in the Moray Firth the maximum weight caught was 1.5kg. From these samples, standard carapace length and sex were recorded for all individuals. Where possible, from each haul further morphological measurements were taken from samples comprising of up to 25 males and 25 females. The parameters included 3 measurements from each claw, tail dimensions, various weights and the maturity stages of both the males and females. This data helps towards reaching Data Collection Framework targets for monitoring maturity in *Nephrops*; but also supported an assessment requested by A Gibb at Marine Scotland to calculate a relationship between minimum landing size, tail weight and the number of tails in a 1kg sample.

A Konesberg digital stills camera system was also mounted on the sledge. This was used to collect 271 images whilst the sledge was on the seabed. Features captured on the stills include various species of fish, crustaceans, molluscs, and seapens; a variety of habitats within each survey; and recording the some of the effects of trawling on the sea bed.

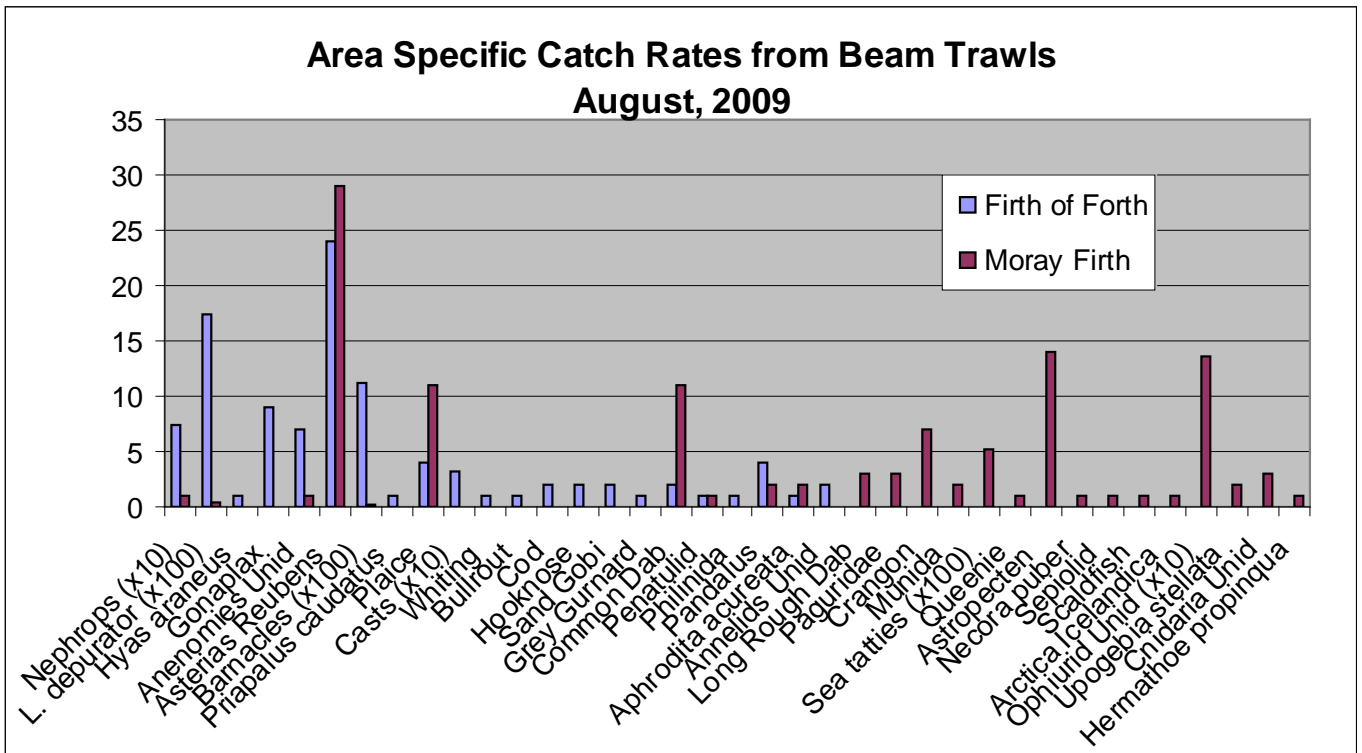
A Weetman
10 December 2009.

Figure 1

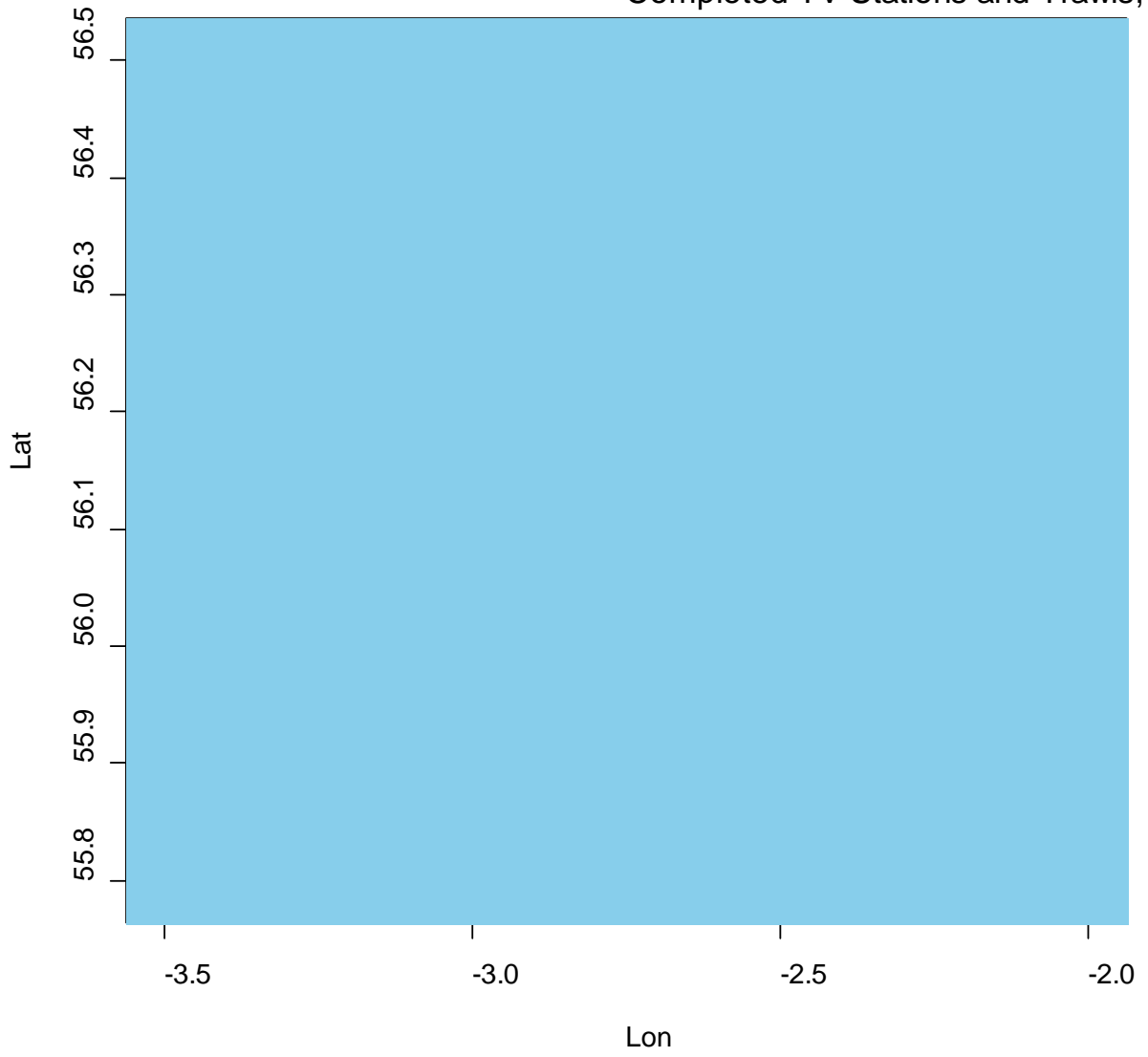
Frequency of species caught on Beam trawl, by haul and location.

Scientific Name	Common Name	Firth of Forth			Moray Firth		
		A09/28	A09/30	A09/32	A09/34	A09/36	A09/38
<i>Nephrops norvegicus</i>	Dublin Bay Prawn	59	10	5	6	5	
<i>Liocarcinus depurator</i>	Harbour Crab	111	1593	36	33	2	2
<i>Hyas araneus</i>	Great Spider Crab	1					
<i>Goneplax rhomboides</i>	Square/Angular Crab	2	1	6			
Anemones Unid	N/A	7					1
<i>Asterias Reubens</i>	Common starfish	15	9		25	3	1
Cirripedia	Barnacles	85	950	90	15		
<i>Priapalus caudatus</i>	N/A	1					
<i>Pleuronectes platessa</i>	Plaice	2		2	8	3	
Calcareous worm tubes	Casts		306	6	1		
<i>Merlangius merlangus</i>	Whiting		1				
<i>Myoxocephalus scorpius</i>	Bullrout		1				
<i>Gadus morhua</i>	Cod		2				
<i>Agonus cataphractus</i>	Hooknose		2				
<i>Pomatoschistus minutus</i>	Sand Goby		2				
<i>Eutrigla gurnardus</i>	Grey Gurnard		1				
<i>Limanda limanda</i>	Common Dab		2		10	1	
<i>Pennatula phosphorea</i>	Sea pen		1				1
Philinidae	N/A		1				
<i>Pandalus montagui</i>	Pink shrimp		4			2	
<i>Aphrodita acureata</i>	Sea Mouse			1	2		
Annelids Unidentified	Bristle Worm			2			
Hippoglossoides platessoides	Long Rough Dab				1	2	
<i>Pagurus prideaux</i>	Hermit Crab				3		
<i>Crangon crangon</i>	Common shrimp				3	1	3
<i>Munida rugosa</i>	Squat Lobster				2		
<i>Echinocardium cordatum</i>	Sea Potato				88		441
<i>Aequipecten opercularis</i>	Queen Scallop				1		
<i>Astropecten irregularis</i>	Starfish				8	5	1
<i>Necora puber</i>	Velvet Crab				1		
Sepiolid	Cuttle Fish				1		
<i>Arnoglossus laterna</i>	Scaldfish					1	
<i>Arctica Islandica</i>	Icelandic cyprine (Mollusc)						1
Ophiuroidea Unidentified	Brittle Star						136
<i>Upogebia stellata</i>	Burrowing Crustacean						2
Cnidaria Unidentified	N/A						3
<i>Harmathoe propinqua</i>	Scale worm						1

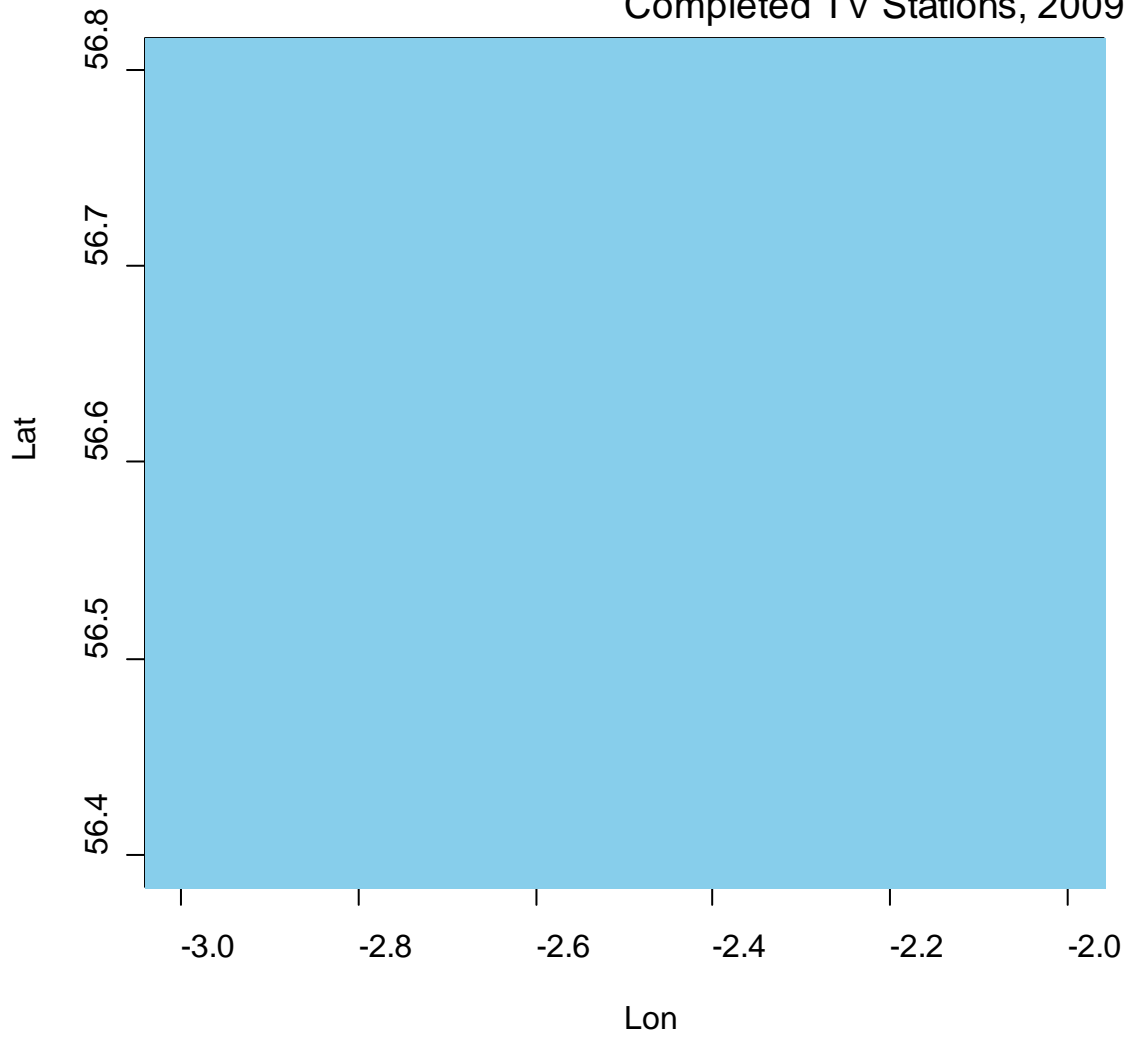
Figure 2



Firth of Forth
Completed TV Stations and Trawls, 20



Arbroath Grounds
Completed TV Stations, 2009



Moray Firth
Completed TV Stations & Trawls, 2009

