

## **A PILOT POT FISHERY FOR *NEPHROPS NORVEGICUS* OFF THE NORTHERN IRELAND COAST**

### **Funding**

This project was proposed by the Anglo-North Irish Fish Producers Organisation Ltd (ANIFPO) and was supported by the Agri-Food and Biosciences Institute (AFBI) and the Department of Agriculture and Rural Development (DARD). It was co-funded to a maximum of £49,000 through the EU Building Sustainable Prosperity Programme administered by DARD Fisheries Division.

### **Management**

The study was managed by officials from DARD, ANIFPO including the owners of the vessels engaged in the study and AFBI who carried out scientific monitoring of the pilot fishery.

### **Overview**

With the introduction of the Irish Sea cod recovery programme and its associated temporary sea area closures, several Northern Irish fishing vessels were displaced. They were encouraged to find sustainable alternatives to complete their annual fishing plans.

Amongst the fishing vessels affected were four small (under 12 metre) vessels, which had traditionally targeted cod using gill-nets. The closure effectively stopped this fishery. As a result the four vessels, like many of their larger colleagues diversified into the *Nephrops* fishery using trawls.

However, with the increasing costs of fuel and other overheads, combined with reductions in the landed price for *Nephrops*, the owners of the four vessels, together with the ANIFPO, decided to investigate alternative fishing opportunities. Following internal discussion, and with DARD's Sea Fisheries Division, an application for

funding was submitted to allow sea trials in the “open Irish Sea”, to examine the practicalities of using pots/creels to catch *Nephrops*. While creels were used in Strangford Lough, and other similar Loughs around Scotland, the possibility of using creels in areas traditionally trawled had not been investigated.

Potential benefits associated with a creel fishery were;

1. Reduced over heads, primarily as a result of reduced fuel burn.
2. Possible reduction in discards.
3. Development of a “live” market, thus increasing the landed price for the product.
4. More “environmentally friendly” fishery.

Of the four ANIFPO vessels associated with the initial proposal, one was sold and one opted not to participate. Other vessels were invited to participate, but there were no additional takers.

## **Introduction**

The Dublin Bay prawn, Norway lobster, langoustine or *Nephrops* (scientific name: *Nephrops norvegicus*) is a burrow dwelling marine crustacean closely related to the lobster and is the only species of *Nephrops* found in European waters. The generic name *Nephrops* may be translated as "kidney eye." Adults inhabit burrows in the bottom sediment of off-shore waters at depths of 14-800 metres from Iceland (64°N) to SW Portugal (36°N) and the Mediterranean Sea. They only emerge from their burrows to forage for food and to mate. As with all crustaceans *Nephrops* periodically shed their calcified exoskeleton, which is accompanied by a growth increment. *Nephrops* have a planktonic larval phase which aids dispersion, though the western Irish Sea is characterised by a whirlpool or gyra phenomenon that retains both sediment and larvae in the area.

Although there is some creeling in UK waters and in Strangford Lough Northern Ireland, *Nephrops* are caught mainly by trawls. These vessels traditionally use single net trawls of low headline height ( $\leq 1.5\text{m}$ ) and with the same mesh size throughout.

Since the early nineties, there has been an increasing trend towards the use of twin-trawls ie two nets towed at once. In recent years the United Kingdom fishery lands over 30,000 tonnes of *Nephrops* per annum at a first sale value of more than £50 millions. Irish Sea stocks are exploited mainly in the waters to the west of the Isle of Man. Most landings from this area are by Northern Ireland (6,000 tonnes per annum) and the Republic of Ireland (2,000 tonnes) with a combined first sale annual value of about £10 millions, which make it the most valuable fishery in these waters. Smaller quantities (about 600 tonnes) are landed from the eastern Irish Sea and are landed into Cumbrian ports.

This project was established to investigate the viability of fishing *Nephrops* by creels in the western Irish Sea off the County Down coast, Northern Ireland.

## Methods

The two Kilkeel vessels *MFV Amity* and *MFV Margareta* were chartered for the study. Historically these vessels were used in a whitefish gillnet fishery and have the following specifications:

<i>Specification</i>	<i>MFV Amity</i>	<i>MFV Margareta</i>
<i>PLN</i>	<i>N444</i>	<i>N840</i>
<i>Home port</i>	<i>Kilkeel</i>	<i>Kilkeel</i>
<i>Length</i>	<i>10.6m</i>	<i>11.7m</i>
<i>Beam</i>	<i>3.9m</i>	<i>4.6m</i>
<i>Gross tonnage</i>	<i>10.88</i>	<i>17.29</i>
<i>Power</i>	<i>132Kw</i>	<i>223Kw</i>
<i>Normal gear</i>	<i>70mm Trawl/Pots</i>	<i>70mm Trawl/Potsl</i>

Pots were fished on 6 lines of 40 pots off the County Down coast, Northern Ireland (Figure 1). Pots were approximately 30 metres apart and baited with salted herring. Daily log sheets (Appendix 1) were maintained and provided records of date, position of pots, *Nephrops* and bycatch catch data. Catches were marketed by the skippers in the normal way. AFBI observers took part in 5 trips (Appendix 2 & 3) and catch was sampled for length frequency measurement and other biological parameters.

## Results

During the trials *MFV Amity* completed 16 trips and *MFV Margareta* 35 trips between 20 February and 31 May 2007. Daily log sheets were forwarded to AFBI and observers provided data for their 5 trips (2 aboard *MFV Amity* and 3 aboard *MFV Margareta*). The location of the trials is plotted in Figure 1 which also shows this area in relation to the ground covered by the annual AFBI/MI underwater television surveys. The trials were performed on the edge of the main western Irish Sea *Nephrops* grounds, where larger *Nephrops* are often found and the ground can be unsuitable for trawling. Figure 2 shows total *Nephrops* catch by the two vessels by trip and Figure 3 is the catch rate by line and by pot for both vessels. Average values are shown in Table 1.

Table 1: Average catch rates during *Nephrops* creel fishing trials

Average Catches	<i>MFV Amity</i>	<i>MFV Margareta</i>
Per trip	362.8 ( se $\pm$ 39.9)	397.0 ( se $\pm$ 27.7)
Per line	60.5 ( se $\pm$ 6.6)	69.7 ( se $\pm$ 4.3)
Per pot	1.5 ( se $\pm$ 0.17)	1.7 ( se $\pm$ 0.11)

Analysis of catch samples indicated over 90% of the catch were large male *Nephrops* and these had a mean carapace length of 36.9mm compared with 24.1mm for trawled animals caught during an AFBI survey in April 2007 by *RV Corystes*. The small number of female *Nephrops* caught in the creels had a mean carapace length of 34.8mm. The predominance of male *Nephrops* indicates that the female component of the population was underground incubating their eggs as is known to occur during the winter months (Briggs, 1995). *Nephrops* size composition data for the creel caught animals are presented in Figure 4 and Figure 5 is a comparison of creel caught and trawl caught *Nephrops* size compositions. Catches were relatively clean but with some bycatch of velvet crabs, squat lobsters and small fish (Appendix 3).

## Conclusions

Although *Nephrops* were caught during the study, catch rates were low (mean  $386.3 \pm 22.7$ ). The size composition of *Nephrops* caught by creels was significantly higher

than trawl caught animals, but the economic viability of this method of fishing is dependant upon market value of catch sales. Carapace length (*CL*) frequency distributions were converted into whole weights using the length-weight relationship adopted by ICES (from Pope and Thomas 1955).

$$\text{Wt Males} = 0.00032CL^{3.21}$$

$$\text{Wt Females} = 0.00068CL^{2.96}$$

Catch numbers were raised to weights and converted to value by applying a range of hypothetical catch values per kg and presented in Figure 6.

The initial opinion from the fishermen involved in the trials was that a commercial fishery would only be viable with a large number (1,000+) of creels. The area over which these creels would have to be spread could then lead to gear conflict with trawlers. However, further discussions have been more encouraging. One of the vessels has purchased the creels used in the trials, with the intention of developing the fishery. To support this initiative, the ANIFPO Ltd, through its Fish Sales Division, is investigating further the potential for a “live” market, which could substantially increase the value of the catch, and therefore require the use of fewer creels to make the fishery viable.

## **Acknowledgements**

The ANIFPO Ltd and its members wish to acknowledge the support provided by the EU, through FIFG funding for the project, the Department of Agriculture and Rural Development (DARD) who provided national funding and advice, the Agri-Food and Biosciences Institute in Belfast, in particular Dr. Richard Briggs for their invaluable input to the project.

## **References**

- Briggs, R.P. , 1995. Variability in Northwest Irish Sea *Nephrops*. *Fisheries Research*. **23**, 175-187.
- Pope, J. and Thomas, H. A., 1955 Some biometric observations on *Nephrops norvegicus* (L.). *ICES Document No 180 (mimeo)*.

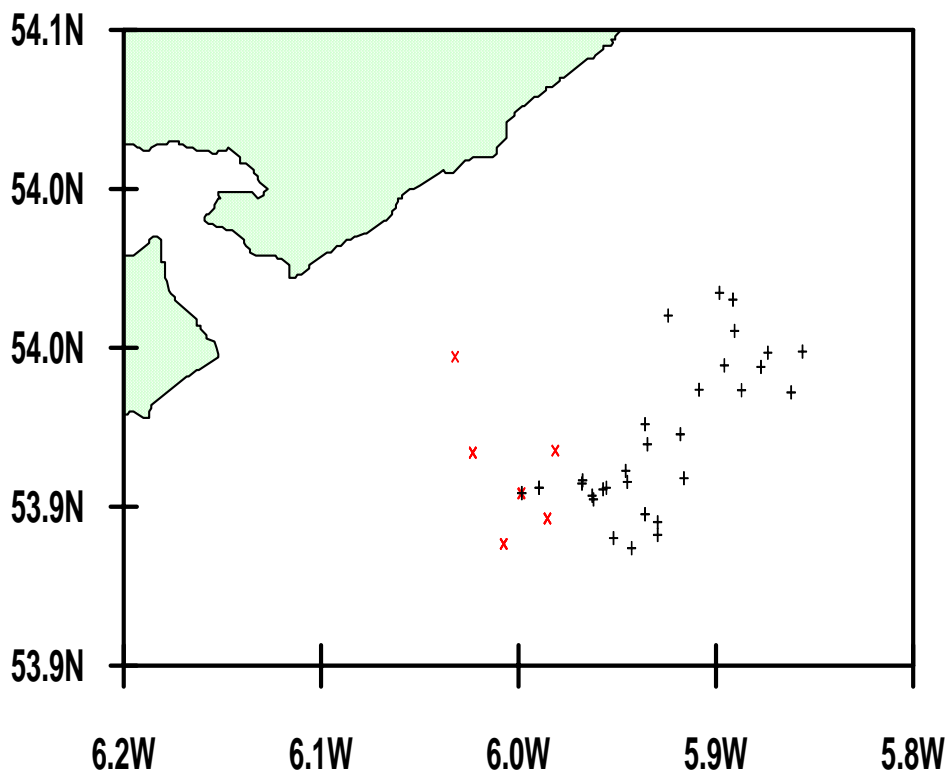
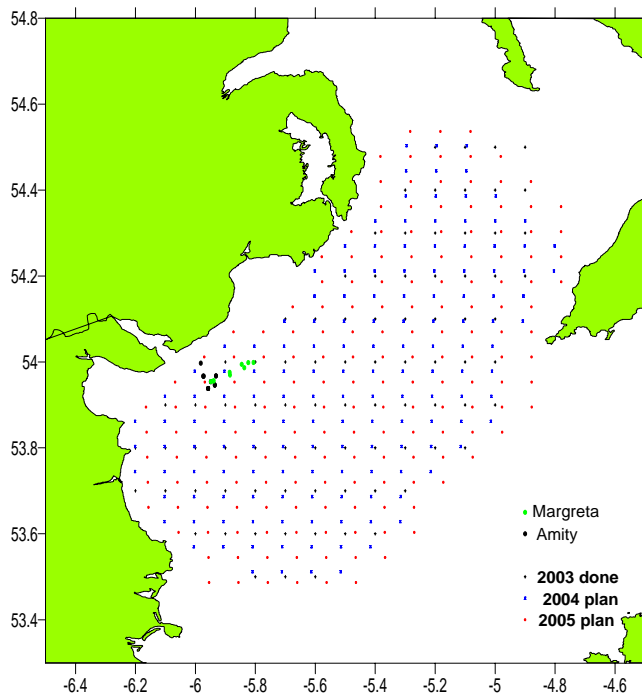
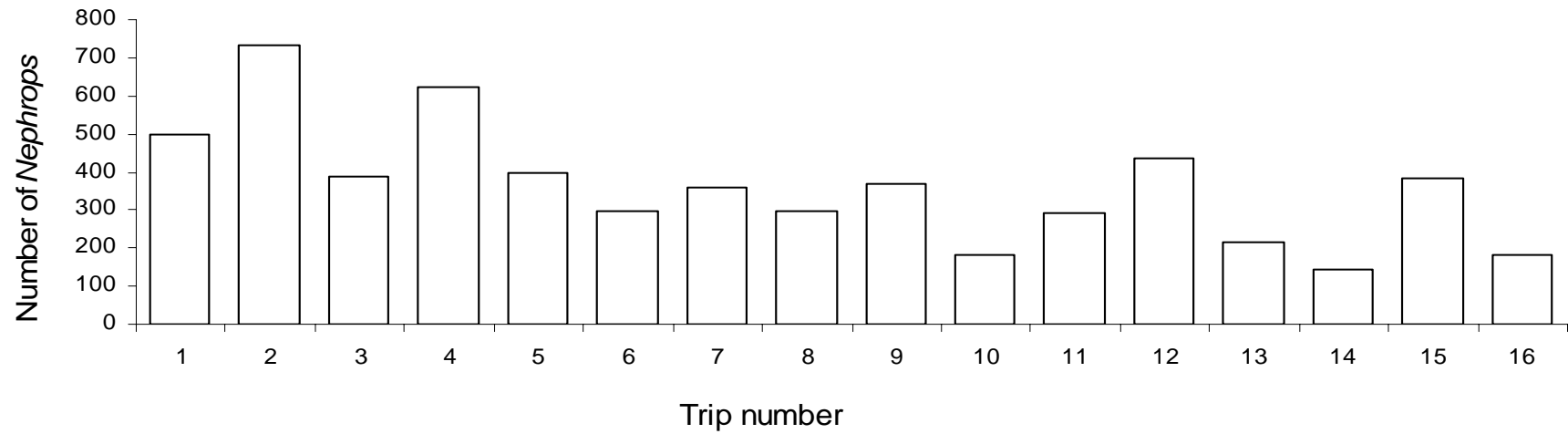


Figure 1: Location of pot fishery and inset showing stations sampled during UWTV surveys

**MFV Amity: Total catch per trip**



**MFV Margareta: Total catch per trip**

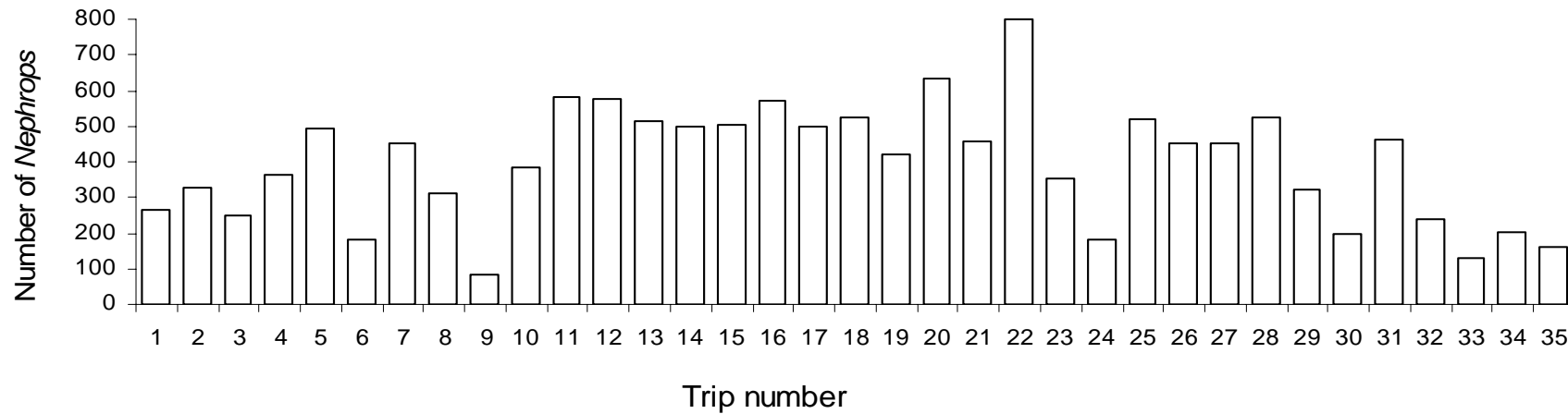


Figure 2: Catch rate by trip for *MFV Amity* and *MFV Margareta*

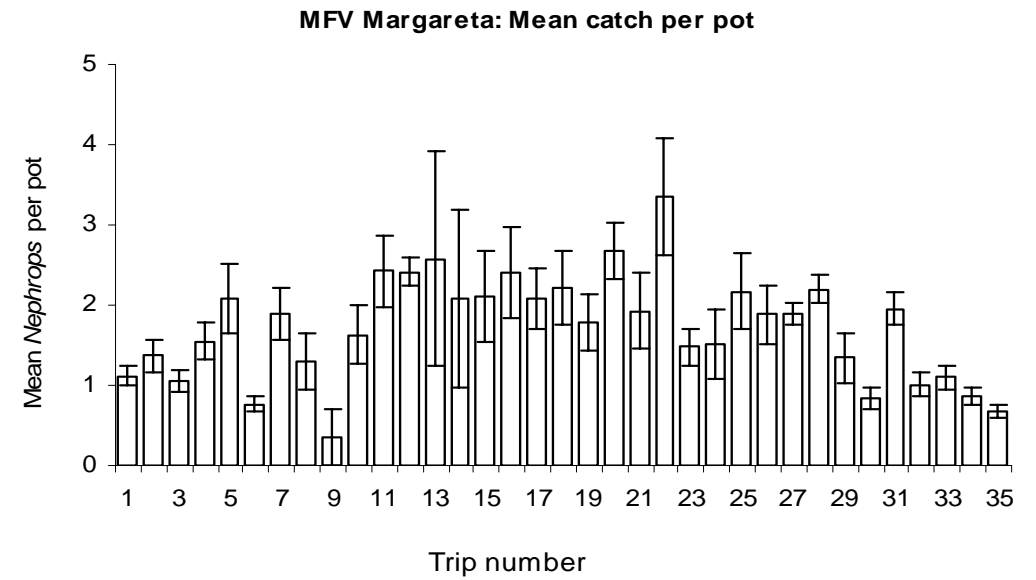
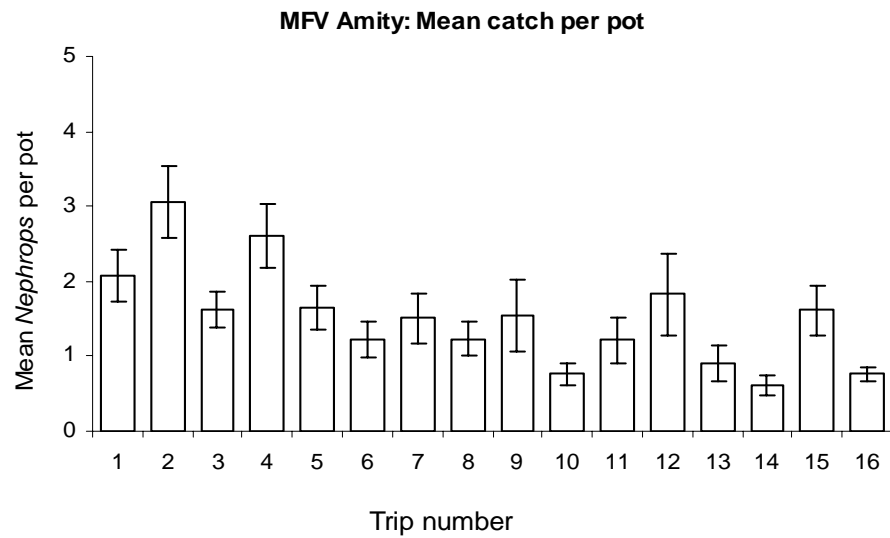
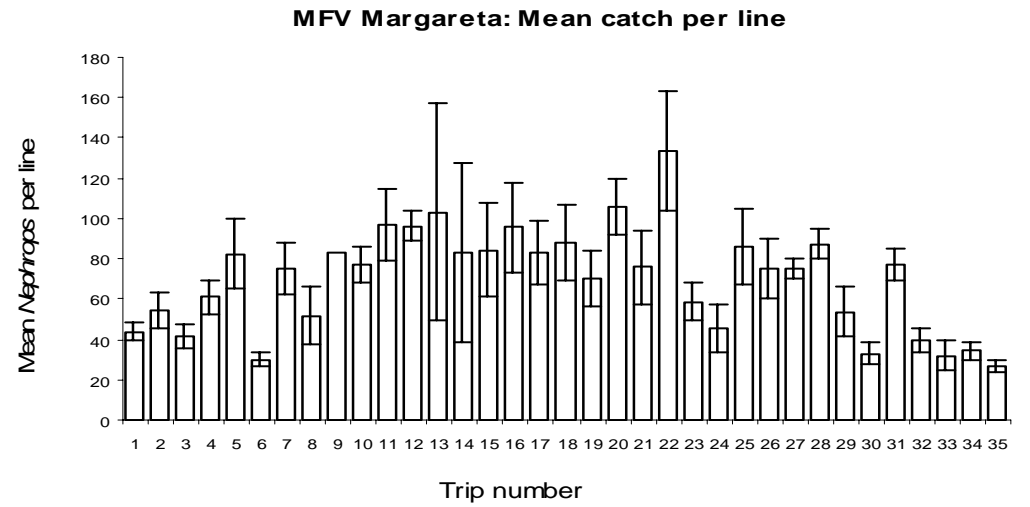
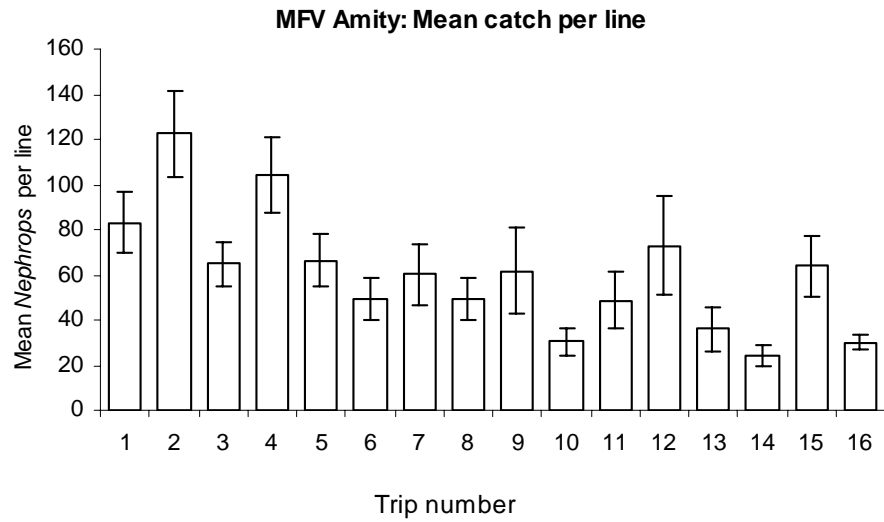
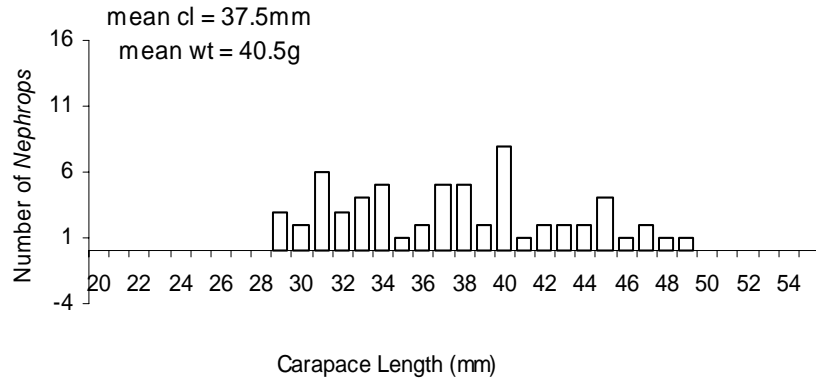


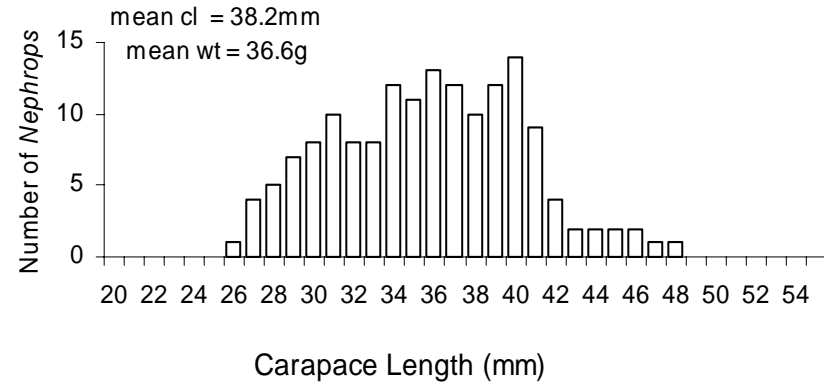
Figure 3: Catch rate by line and by pot for the two vessels  
 (Vertical bars = Standard Errors)



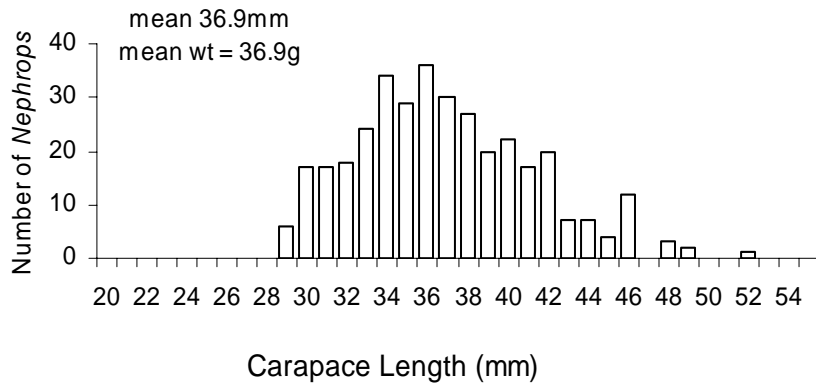
MFV Amity  
Male Nephrops sampled 2 March 2007



MFV Amity  
Male Nephrops sampled 28 March 2007



MFV Margareta  
Male Nephrops sampled 1-3 May 2007 (3 trips)



MFV Margareta  
Female Nephrops sampled 1-3 May (3 trips)

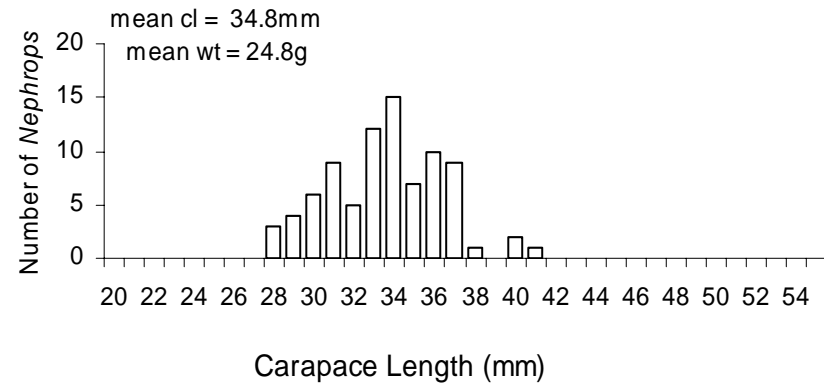


Figure 4: *Nephrops* size composition measured from samples collected by observers

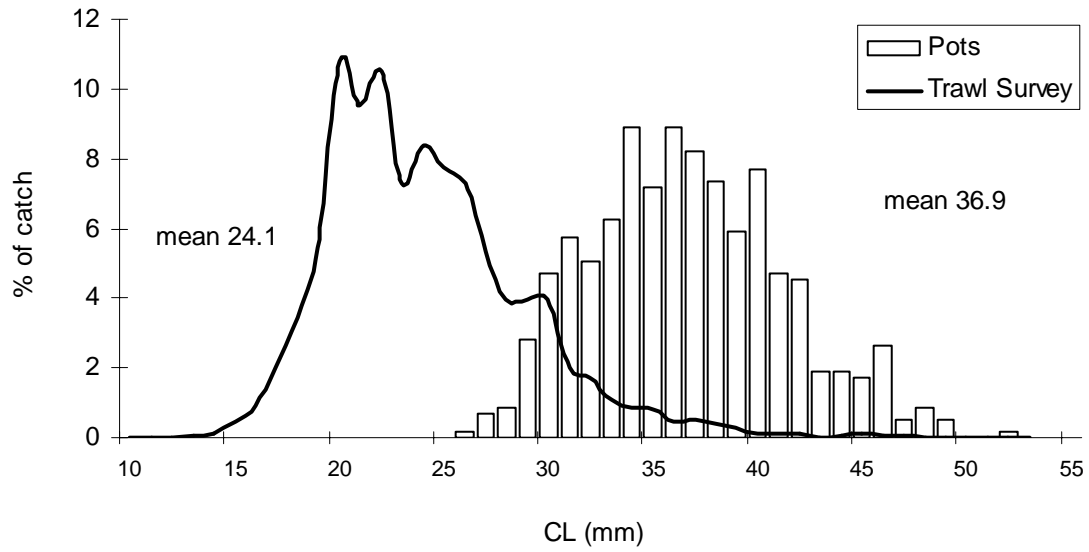


Figure 5: Combined Male *Nephrops* from all trips and AFBI April trawl survey data

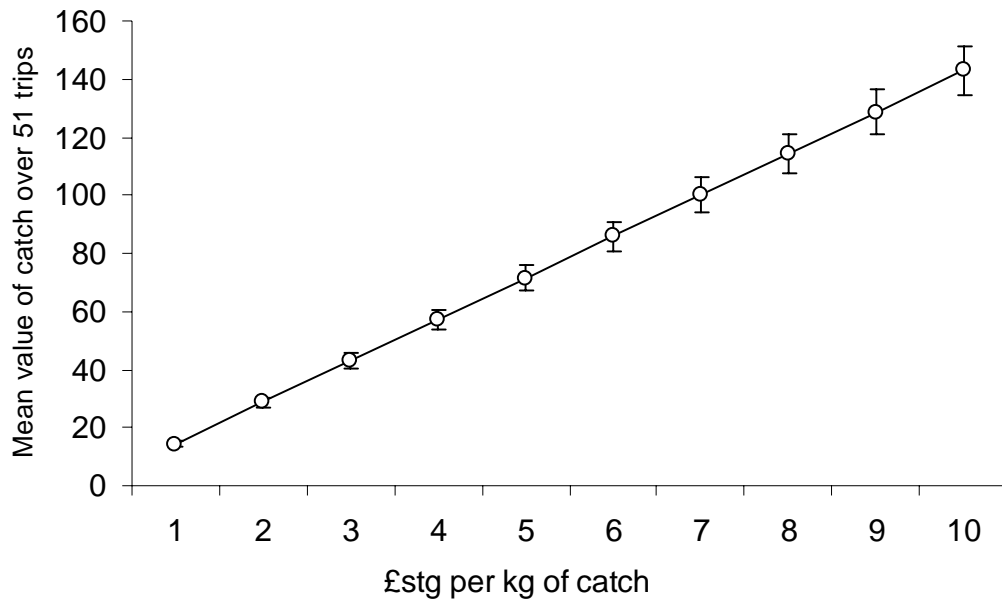


Figure 6: Predicted value of daily (trip) catch at a range of *Nephrops* prices per kg. (vertical bars = standard error)

**Appendix 1:**

## *Nephrops* Pot Fishery Log Sheet

Vessel Name  Total No. of pots

Date & time shot  Date & time hauled

Position (Long/Lat)

Line	Catch in kg, stones, Nos (delete as appropriate)					Notes
	No. pots	<i>Nephrops</i>	Velvet Crabs	Shrimps		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Average count

**COMMENTS & DETAILS OF WEATHER AND SEA STATE**

*Please return to:* Dr Richard Briggs  
Fisheries & Aquatic Ecosystems Branch,  
AFBI

Skipper's Signature: \_\_\_\_\_

Newforge Lane,  
Belfast, BT9 5PX

## **Appendix 2: Observer Reports**

### ***Nephrops* Pot Survey, cruise report**

**Vessel** – Margreta M

**Dates with Observer on board** – 1<sup>st</sup> – 4<sup>th</sup> May 2007

**Observer** – Greg Foster

The observer left Belfast on the morning of Tue 1<sup>st</sup> May 2007 and boarded the Margreta M in Kilkeel. Five lines of creels were lifted the first day. There were 40 creels per line and the creels were approx 15 fathoms apart. On first inspection the quality of the prawns appeared good and predominantly consisted of large males.

The skipper informed the observer that even though the quality was good they would only get normal prices for them, similar to trawl caught prawns i.e. about £4 per kilo.

It should also be noted that the pots were set on Sun 29<sup>th</sup> April and so had been lying for 2 days.

By-catch included whiting, wrasse, four small cod, starfish, swimming crabs, shrimps and squat lobsters. The skipper also informed the observer that when they get a lot of “crossings” (i.e. brittle stars) in the creels, the prawn catches tend to be low.

Another three days were spent observing on the Margreta M, and the catches for the following days were noticeably lower (Table 1). The quality of nephrops was also not as good as it had been on the first day. It must be noted that these lines had been lying for only 1 day unlike those hauled on the first day. A total sample of 15.15 kg was taken for the week, divided into males and females and carapace lengths measured.

**Table 1**

Date	No. creels lifted	Total No. prawns	Total weight prawns (KG)	Total prawns per Kilo
01/05/2007	200	816	32	25.5
02/05/2007	240	506	21	24.1
03/05/2007	240	506	19	26.6
04/05/2007	240	573	23	24.9

The skipper informed the observer that this ground was normally very productive when trawled. However due to the rocky nature of the bottom it was difficult to fish and only trawled by a few boats who know the area very well.

It was also noted that there could be a large difference in numbers caught even with creel lines lying close together. For example one line may produce 1-5 prawns in total whereas another line less than 100m away may produce over 100.

Overall conditions that week were not very conducive to prawn fishing. Tides were fairly strong, there was a steady easterly wind and the water was remarkably clear that week. As well as that May is a notoriously bad month in the fishing calendar.

It is difficult to see how a pot fishery can work unless fishermen get better prices for prawns and are able to lift a lot more creels in one day, maybe about 1000 creels/day. The skipper informed the observer that during the first part of the survey when Amity was laying creels, there were times when they both boats fished similar areas. However the Margreta M had been catching a lot more quality prawns in the trawls than the Amity. Even though trawling would have incurred higher fuel costs the larger catch more than compensated.

Greg Foster

May 2007

## **Prawn Creel Survey Kilkeel. Observer Trip 28/03/07.**

Pots were fished in leaders of 40 baited with salted herring. When fresh bait was tried small edible crab became a nuisance and prevented Nephrops from entering pot. On this day only five leaders were hauled as one leader had been towed away by a scallop dredger on the previous day. Between five and ten percent of pots yielded no prawn, the remainder yielded between one and six prawns per pot. The pots also contained a range of discarded species consisting of whiting, dab, sea scorpion, goldsinny wrasse, cod (17, 18, 20 and 22cm.), butterfish, swimming crab, small edible crab, squat lobster (4 in number) and sunstars. The pots also yielded velvet swimming crabs and penaeid shrimps. In total the catch for the day consisted of 18kg of Nephrops, 12kg of velvet crabs and 1kg of shrimp. A 6.55kg sample of the nephrops was taken and this was found to contain 164 individuals of which 161 were males and 3 females.

### Appendix 3: Photographs



MFV Amity leaving Kilkeel: Day 1





**Bycatch: shrimp (*Palaemon serratus*)**



**Bycatch: squat lobster (*Munida* spp)**



**Bycatch: velvet crabs (*Necora puber*)**