SR628_Cornish Beam Trawl Diversification Project_IPF C071

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Summary:

With continued rising cost for fuel and no indications of prices falling back again the South West Beam trawl are looking for alternative fishing methods to target monkfish and megrims on their traditional fishing grounds.

In Scottish waters many vessels target the same species using twin rig otter trawls. This project was set up to charter one of the Scottish vessels to fish the SW ground using twin rig to see if this would be a viable alternative for the SW fleet.

The landings of the twin rig vessel were much less than local beam trawlers but much time was lost in exploring the beam trawl grounds for their suitability for towing with twin rig otter trawls. Despite this the catch rate for the time spent actually fishing indicates that twin rig could be a viable option in the SW.

The catch profile of the twin rig is different to that of a beam trawler. Twin rig trawlers catch more higher swimming fish than beam trawlers. More knowledge of the stocks of these fish in the SW is needed to allow for otter trawling being financially viable.
The discard rates recorded during the trials are not representative of discard rates for otter trawls in the area.

The standard twin rig setup may need altering to better suit the SW fishing grounds and the fish species on them.

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1. Introduction

The project was initiated to explore ways in which Monkfish and Megrims, the main target species of the Cornish beam trawler fleet could be targeted in a more cost-effective and environmentally acceptable method on the traditional beam trawl fishing grounds. At the start of the project the whole of the UK fishing fleet were facing spiralling fuel costs. The beam trawl fleet in SW England in particular, were suffering badly from this increase in fuel prices. This sector of the UK fishing fleet was also coming under increasing criticism from the environmental lobby, in respect of both seabed impact and the amount of discards being recorded. The best option seems to be to follow the Scottish example and trial twin-rig trawling on the SW beamer grounds to target these species.

2. Background

In 2006 and 2007 the price of marine diesel took a dramatic increase in price, from mid 2007 to mid 2008 the price of diesel fuel in the UK doubled! This had a direct and immediate effect on the viability of all fishing vessels in the UK. Some of those that felt the greatest effect of these rises were the beam trawlers in South West England.

Beam trawlers generally target low volumes of high value species, towing faster than comparable otter trawlers to enable them to cover a large enough area of seabed with their relatively narrow beam trawls. A combination of the high fuel prices and pressure from the ENGOs particularly on the consumer end of the supply chain has put the long term viability of the SW beam trawler fleet in to question.

The Cornish beam trawlers land in the region of 90% of the megrims and 70% of the monkfish that is landed in Cornwall. This equates to a first sale value in excess of £7 million or 50% of Newlyn's wet fish landings.

The beam trawl fleet in this area can work their gear over a wide range of seabed types depending on species availability on the grounds. Their fishing patterns are not dictated by the tidal phases enabling them to land on a regular basis into the SW ports. This ensures the onshore buyers and processors in the SW have the opportunity for regular supplies of quality fish throughout the year. This is then passed on to the leading UK multiples and food service sector throughout the UK and on the continent.

To avoid the potential failure of the supply of fish from the beam trawl fleet that could lead to the collapse of the market and much of the shore based infra structure of Newlyn fishing industry, it is important to investigate alternative capture methods to ensure continued supply of these species.

In recent years monks and megrims have been targeted very successfully by vessels in North of Scotland employing twin rig trawling. This fishing method was introduced to NE Scotland from Denmark in the late 80s to target shrimp and *Nephrops*. Initially by the 16m – 20 m class of vessel. As its effectiveness for targeting not only *Nephrops*, but also bottom living fish was realized, many vessels soon took up this fishing method. It was very quickly adopted and adapted by the larger vessels, in the 25 – 30m class, to target bottom living fish species (monkfish and megrims) in the deeper water off the West Coast of Scotland. In more recent times the Scottish vessels have been getting viable catches of megrims and monks in areas where

previously there were very few of these fish caught. According to anecdotal evidence there has been a re–generation of monkfish and megrims in Scottish waters in the last 10 -15 years.

In the mid 1990's due to the highlighting of environmental concerns and being aware of their high fuel consumption Dutch and Belgian beam trawlers were being encouraged to find alternatives to beam trawling. The skippers looked at several other fishing methods such as twin rig trawling, outrig trawling and seine net. Many of them went for twin rig and successfully modified their vessels to enable them to alternate between twin rig and beam trawl.

Belgian beam Trawler converted to use twin rig as well as beam trawls.

This gave them the versatility to use the most effective and efficient fishing method to exploit their allocated quota for different species at specific times of the year. The continental twin rig setup has been developed and perfected to suit the local seabed conditions of vast areas of relatively flat sandy sea beds. The Scottish fishermen have developed their twin rig gear for working the harder and rougher sea beds encountered to the west of Scotland. Were this method to be taken up by the SW fleet, they too, would have to adapt the gear to suit the seabed conditions and the fish species on their own fishing grounds.

As yet there is very little twin rig trawling done in the SW England by the over 10m fishing fleet. For many years twin and triple rig has been used by small vessels in SE England to target Dover sole. This style of fishing has spread west along to other channel ports, but it is limited in its applications to clean ground and non herding fish species (ie dover sole). The Scottish style of twin rig is more suitable to a mixed demersal fishery. In the last 5 years this method has been introduced successfully by

the smaller vessels in South and SW English inshore grounds. Taking the Scottish fleet as an example, it would appear that the uptake of twin rig would appear to be one of the best options for the SW beamer fleet to enable them to remain viable. This project was set up to assess the potential and highlight any problems associated with introducing twin rig demersal trawling, similar to that used by the Scottish fleet to the South West beam trawl grounds.

3. Aims and Objectives

- To ascertain whether Monkfish and Megrim can be caught in SW waters, on the grounds currently fished by beam trawlers in a manner or method which is more economically viable than the current beam trawl fleet.
- To produce economic information to compare catch rates, fuel savings, gear for the two types of fishing.
- To identify any skills shortages required to pursue different methods.
- To monitor and record the discards encountered with the twin rig gear and compare this with existing data available for relevant beam trawlers in the same area.
- To monitor fish quality and prices throughout.

4. Methodology

From past research and background knowledge it was agreed that the best approach to this project would be to charter a vessel and skipper that has a proven record of hard ground twin rig trawling to fish the SW beam trawl grounds.

The priorities for this vessel were

4.1 To have extensive experience of rough ground twin rig trawling for bottom living fish.

4.2 To have gear that would be suitable for use on the SW beam trawl grounds. These grounds were known to have numerous boulders and unknown sea bed obstructions. There was no past records of the ground being worked by demersal otter trawlers from the UK

4.3 To have a skipper and crew who were familiar with working twin rig on a variety of seabed types and familiar with the problems it can present.

The contract for a suitable vessel to undertake the sea trials was put out to tender, with the tender being made available to vessels throughout the UK. In all nine vessels tendered for the sea trials. The final choice was made on a combination of best value and suitability for the project. One of the larger vessels that tendered, the Alison Kay (LK 57) from Shetland was chosen. This vessel was chartered to give the project every chance of being successful in that it was felt that the larger vessel would be able to give a better indication of the potential for twin rigging on the SW grounds for all classes of vessels. The agreements of the charter were that the catch would go to offset the cost of the charter. For this reason it was necessary for the vessel to gross enough from fish landings to ensure the continuation of the sea trials into the second and third trip.

The vessel was chartered for a period of up to 28 days; this would allow time for the vessel to steam from its home port and up to 3 trips of 7 days each. The main

objective was to trial twin rig trawling on the traditional beam trawl grounds exploring the possibilities for commercial twin rigging in as many areas as possible. Local knowledge was supplied by Steve Moseley, skipper of Newlyn based beam trawler Billy Rowney PZ 532, who sailed onboard the first trip. The Billy Rowney was also at sea under command of the first mate, thereby giving a good haul by haul comparison between twin rig and beam trawling. Decisions on where to trawl were taken by James Anderson, skipper of the Alison Kay, in discussion with beamer skipper Steve Moseley and the project manager onboard. The vessel was to follow a similar trip routine to that commonly used by the local beam trawl fleet but would maintain the vessels own twin rig haul and shoot regime of towing for 5 hours as far as possible. This will ensure that the catch can be compared favourable with the landings of the local beam trawlers. For much of the fishing grounds that were to be explored the only fishing chart information available was the navigation plotter charts from the beam trawlers. It was known that this ground was largely soft sand but interspersed with large boulders and other obstacles. The Alison Kay would be towing on uncharted seabed as far as demersal otter trawling was concerned. This could lead to regular seabed fasteners, damage to gear or even total loss of trawls and trawl doors.

The Alison Kay spent many years fine tuning his trawl gear to efficiently target monkfish and megrims in Scottish waters. The vessel is also responsible for opening up many areas of previously un-fished seabed in the waters North of Scotland. It was decided that their standard gear would be used for the sea trials. Fishing charts for the SW were supplied by local skippers and representatives from Seafood Cornwall and CFPO.

All fishing tracks were recorded along with catch data. Both retained catch and discarded fish were recorded for each haul. The retained catch was processed (gutted, washed and species selected) then passed down to the fish room where it was weighed and boxed. These weights were recorded for each haul and samples of the main species were measured and the numbers raised to the full catch values. The discards from each haul were quantified and a random sample retained for species selection and measurement. These figures were then raised for each haul.

5. Vessel and gear

Alison Kay LK57 (Tonnage gross 246 T)
Built at Karstensens Yard in Skagen, Denmark in 2001
Length OA 23.95m, Registered 22.37m, Beam 8.01m and a draught of 5.08m

Powered by a Caterpillar 525KW (775hp)

Skipper James Anderson.

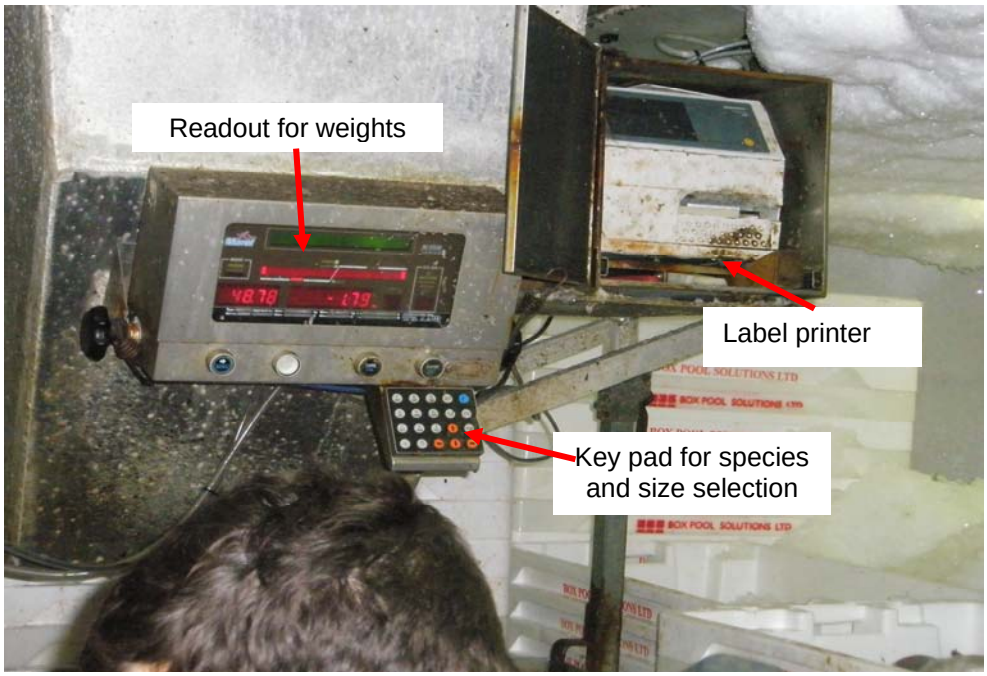
MFV Alison Kay LK57

The vessel is rigged as a double decked twin rig stern trawler. The trawl gear is all worked from the top deck. Two split winches aft of the wheelhouse and the centre trawl winch on the fore deck ahead of the wheel house, with the warp being led aft beneath the wheelhouse to a central trawl block for the centre clump of the twin rig set up. The trawls are handled using 4 net drums on the upper deck with the codends being taken onboard over the stern and emptied into a large hopper at the stern. The lower deck is a dedicated fish handling deck aft. The fish are taken out of the hopper by conveyor, onto a transverse conveyor belt for gutting, species selection, then passed into different sections in the fish washer. The retained fish are then released from the washer, by species and dropped below onto a tray in the refrigerated fish room. The discards are taken directly overboard by another conveyor.

Once the catch is in the fish room the crew would normally grade and weigh all the fish before stowing them in plastic boxes. The weights of fish, grade, species, time, and date of boxing, and vessel name are then printed on an adhesive label that is then stuck on the end of the box. This information is also passed to the wheelhouse computer to electronically store the catch data. Full details of the

vessels catch can then be e mailed ashore prior to landing to alert the fish buyers as to the make up of the vessels landings before they are in harbour.

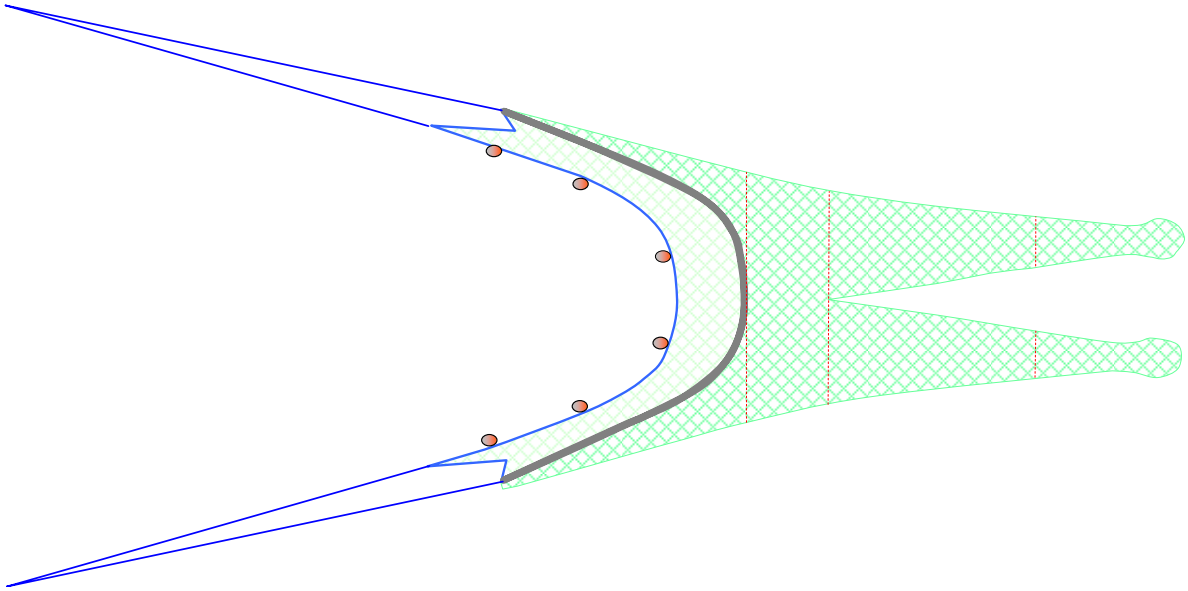
The labels are left on the boxes to display the full details of the box contents for the buyers at the fish auction. This method ensures that there is no need to re-weigh or reselect the fish when it is landed on the market. For this trial the crew will not grade the fish onboard, leaving the fish to be weighed and reselected on the Newlyn fish market in a similar manner to all the local vessels. This will ensure that the size selections are consistent with other catches landed in Newlyn. This should enable a good comparison of market prices for the Alison Kay fish in comparison with other vessels landing that day.



Weighing and labelling equipment in the fish room of Alison Kay

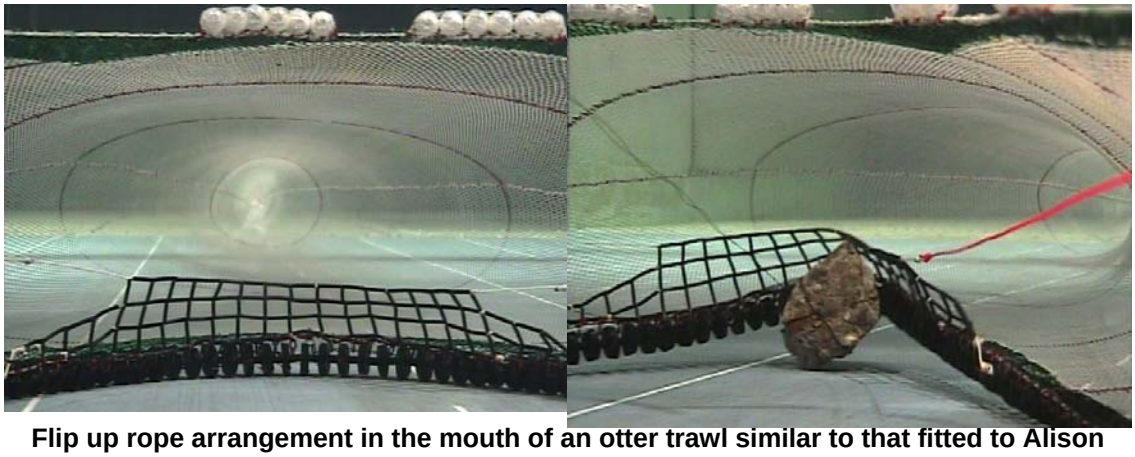
Box label with full details of contents

The trawls used for the trials are two Jackson double bagged trawls with a footrope length of 150 feet. This is a fairly new design of trawl for UK vessels to use and has proved to be very efficient for Alison Kay and several other Scottish vessels for targeting bottom living fish species and *Nephrops*. The concept of the two bags and codends is to increase the horizontal mouth opening of the trawl without increasing the overall drag of the trawl.



Plan view of double bagged trawl

Both trawls were fitted with the vessels usual 120mm mesh codends and spread with a set of Morgere polyfoil trawl doors with a roller clump on the centre warp. The gear is monitored with a Rapp pentagon autotrawl system that ensures that the twin rig gear is towed square at all times and pays out warp in the event of the gear becoming fast on a seabed obstruction. This can be a vital piece of equipment for any vessel trawling over unknown ground to help minimise the chance of lost or damaged gear. Both trawls have flip up ropes fitted across the footrope bosom, to prevent boulders going into the trawl. These are similar to that fitted to beam trawls. Taking into consideration the unpredictable seabed and expectation of boulders, the use of these will be a great advantage to the trials.



Flip up rope arrangement in the mouth of an otter trawl similar to that fitted to Alison Kays trawls. Left, normal position. Right, boulder going under the trawl.

The trial planned to use the twin rig gear that the Alison Kay has successfully used in Shetland waters on recent trips, without any modifications. However, concern was expressed by Newlyn skippers as to the large mesh codends used by Alison Kay (120mm) compared to the local beam trawlers usual of 80mm mesh. The local skippers were concerned that the trial vessel would lose too many of the smaller fish to allow a fair comparison between twin rig and beam trawling. In an attempt to alleviate this concern two 90mm mesh codends were fitted to the starboard trawl.

6. Trials plans

The vessel was chartered for up to 21 days of fishing trials. Six days of the charter was allowed for steaming to and from the vessels usual fishing grounds around Shetland to Cornwall, leaving 21 days for fishing trials. This was to be divided up into 3 trips of 7 days, landing into Newlyn for the Monday morning market. These trips were all dependant on the vessel grossing enough from fish sales to part fund the next trips.

6.1. Trip 1

Main objective was to trial the twin rig gear on the grounds frequented by the Newlyn beamers at this time of the year. If possible to get some catch figures from any beamers working in the vicinity of Alison Kay for ongoing assessment of twin rig. Collect discard data for comparison with that already available for beam trawlers. Gross enough from fish sales to ensure the possibility and viability of the next fishing trip.

6.2. Trip 2

Main objective for this trip was to work further west to where French and Spanish vessels are known to work. Also to trawl in deeper water, similar to the depths that the Alison Kay targets megrim and monk in to the North of Scotland. It was also important for the vessel to make enough from fish sales to ensure the possibility and viability of the next fishing trip.

6.3. Trip 3

Using information gleaned from the previous 2 trips to undertake as near a commercial trip as possible with the twin rig gear

7. Sea Trials

7.1. Trip 1

The first trip started with Alison Kay steaming 70nm into SSW to the area that some of the beamers had been working recently. The vessel steamed over the ground before shooting the gear to check the seabed using the echo sounder for any obvious seabed obstructions and its suitability for towing a demersal otter trawl over. The gear was shot in 102 metres depth and towed into NE for 3 hours before coming fast on the seabed. This was the situation for the first 7 hauls in that the gear became fast at periods between 45 minutes towing and 4 hours towing. On most occasions the trawl could be hauled to the stern of the vessel, checked that there was no damage, and slacked away again to resume towing. This caused much frustration and did result in a lot of lost fishing time. It was unclear exactly what the gear was snagging on as there was nothing obvious showing on the echo sounder. As can be seen from Fig 1 each of these hauls (hauls 1-7) were in a different location and towing in a different direction. The main reason for this was to try to get an uninterrupted haul to get a respectable indication of how twin rig would fish on these grounds. It was also an attempt to (a) get away from the snags on the seabed, (b) to tow the gear in a different direction over the seabed, (c) to tow the gear in a different direction in relation to the local tidal flow. It was a period of fairly strong tides, this can often cause the gear to come fast more easily in areas that the vessel would normally tow over without problems. All these can have an influence on whether the demersal trawl gear is able to be towed over the ground or not. However it was concluded from indicators on the gear and catch profile, that this was an area of fairly hard, fine, sharp sand with regular obstacles or boulders scattered across it. The beam trawlers with their chain mat gear can tow over this area but an otter trawl has difficulty. At different states of tide, with more knowledge and experience of the area it may be possible to fine tune the twin rig gear to work this area without too many spoiled hauls. There were several French trawlers around 24m working in this area, but it was not known what type of gear they were towing, it may have been semi - pelagic gear that is lighter on the bottom than the Scottish twin rig gear.

After seven disrupted hauls in 36 hours, with only 45 – 50 boxes onboard (51 kilos of fish per hour) the decision was taken to move to a different area. The fuel usage average out at 123 litres per hour when towing the gear resulting in a Cost per Unit Effort of 0.41kg of catch per litre of fuel used. (CPUE - fuel)

These 7 hauls had been done with 90mm codends on the Starboard trawl and 120mm on the port. Due to difficulty separating catch from the two trawls, considering each trawl had 2 codends, and taking into account that no appreciable difference in retained catch and very little difference in discards had been seen between the two trawls, the vessels standard 120mm codends were reinstated on the starboard trawl.

The vessel steamed 40 miles WNW to an area known as Melville Knoll Bank, where it was thought that the seabed would be more suitable for the twin rig gear and French demersal trawlers were known to work regularly. During hauls 8,9 and 10 the

vessel towed North shallowing the water from 106 m in the South to 80 m in the north. The gear became fast half way through haul 8 but the net was not damaged and the gear was shot away again, the next 2 hauls were completed without incident. There was a similar mix of fish in this area but there was much more discards (37baskets) most of it being small Boarfish. There were 4 French trawlers towing in this area, it was presumed that they were towing for Nephrops on the bank. In haul 9 and 10 there was 15kg and 126kg of Nephrops respectively from the 2 nets. This was looked on two good hauls of Nephrops considering the large mesh in the codends. This gave the impression that were the boat towing *Nephrops* trawls with smaller mesh size that there could be a viable *Nephrops* fishery in this area. With only 600kg of mixed fish (excluding *Nephrops)* in the last 3 hauls the decision was taken to move 40 miles into South East to another area that was regularly towed by the SW beam trawl fleet. (*38 kilos of fish per hour, the fuel usage averaged out at 136 litres per hour resulting in a CPUE (fuel) of 0.28kg per litre*)

The next 5 hauls were in this area towing NE – SW. As the first 2 hauls, haul 11 and 12, were completed without any snags or problems, the 20 fathom single sweeps were added to the gear again, these had been removed on the first day of the trip in an attempt to reduce the chance of the gear coming fast. A total of 1531 kg of fish for a total of 22.5 hours towing resulted from these 5 hauls.(*68.5 kilos of fish per hour, the fuel usage averaged out at 138 litres per hour resulting in a CPUE (fuel) of 0.50kg per litre)*

Haul 16 and 17 were towed East to trial different a area and shorten the steaming distance to Newlyn to land the fish for the Monday morning market. There was a larger proportion of haddock in these last 2 hauls, compared to the rest of the hauls. There was also more mixed fish (lemon sole, plaice ling, john dory and skates) Hauls 16 and 17 produced in the region of 18% of the value for only 9% of the fishing time. (*143 kilos of fish per hour, the fuel usage averaged out at 110 litres per hour resulting in a CPUE (fuel) of 1.3 kg per litre)*

The vessel landed 3088 kg for £11554 for the 5.5 days at sea.

More details of each haul are available in the vessel log (appendix1) and haul log (appendix2)

7.2. Trip 2

One of the objectives for this trip was to try to fish the grounds further west into deeper water. This would be in similar depths to that fished by the Scottish twin riggers targeting monks and megrims to the North and west of Scotland. Onboard this trip to assist with local fishing knowledge was Alec Steven, skipper of the local twin rig trawler Crystal Sea.

The first 3 hauls were taken in a similar area to the last 3 in trip 1, gradually towing into the South West. Results from these hauls were poor with an average of only 250kg for each haul with not a lot of monks and very few megrims. (*only 50 kilos of fish per hour, the fuel usage averaged out at 144 litres per hour resulting in a CPUE (fuel) of 0.35 kg per litre)* By the time the third haul was taken onboard the weather had freshened up to a full gale. Rather than waste time steaming to port it was decided to steam slowly west to the deep water approximately 200miles west of Lands End, on the presumption that by the time the vessel arrived the weather would have improved. Having ‘dodged’ west for 42 hours the gear was finally shot in 80

fathoms of water towing further west into deeper water. This was an area that was known to be fished by Irish, French and Spanish vessels in the past. The first haul was towed west then the next two towed south following the 90 fathom contour. There was one Anglo - Spanish vessel towing north and south alongside the Alison Kay for hauls 4, 5 and 6. The catch rate was very poor with only 200kg of fish for 3 hauls. (*15.7 kilos of fish per hour, the fuel usage averaged out at 130 litres per hour resulting in a CPUE (fuel) of only 0.12 kg per litre)* The Anglo-Spanish vessel was seen to haul and shoot away again twice, it was presumed that they were catching enough to warrant shooting their gear again, but there was no indication as to what they were targeting. In was clear at this stage due to lack of returns from fish landings, that a third trip was going to be unlikely, therefore it was decided to try to make the last few days at sea as near commercial fishing as possible. For this reason the Alison Kay steamed back east for 18 hours to the area where the last few hauls of trip 1 were towed. Although these hauls yielded an average of only 360 kg per haul it was the best fishing during the trials. In the next 25 hours 6 tows in this area gave an average of approximately 340 kg per haul. *(63.8 kilos of fish per hour The fuel usage average out at 131 litres per hour resulting in a CPUE (fuel) of 0.49kg per litre)* For 6 days at sea but only 58 hours fishing the vessel landed 2979kg for a grossing of £10,495.

On researching the Spanish vessel after the trials, it was found that this vessel trawls for bottom fish using the traditional Spanish gear, long low nets with a clean ground footrope and long large diameter, sweeps to target monks, megrims, witches and skates. According to their log sheets the vessel was averaging in the region of 2000kg of fish per 24 hours on the trip when she was alongside Alison Kay. This is many times the catch rate achieved by Alison Kay in this area. The Spanish trawlers normal catch rate is likely to be greater than this as there was several days of poor weather during this trip.

7.3. Trip 3 was cancelled due to lack of financial resources.

Tows from Trip 1

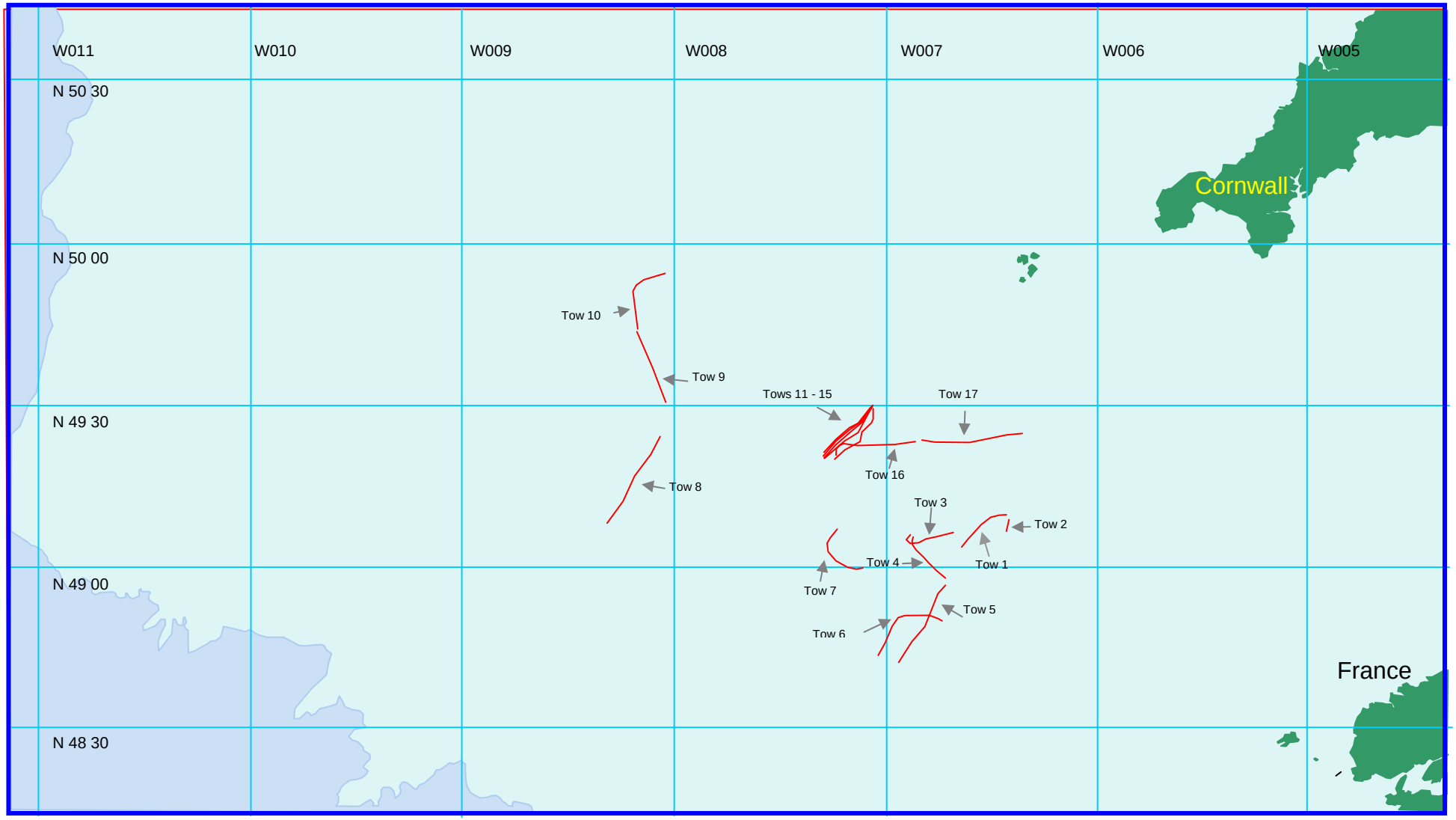


FIG 1

Tows from Trip 2

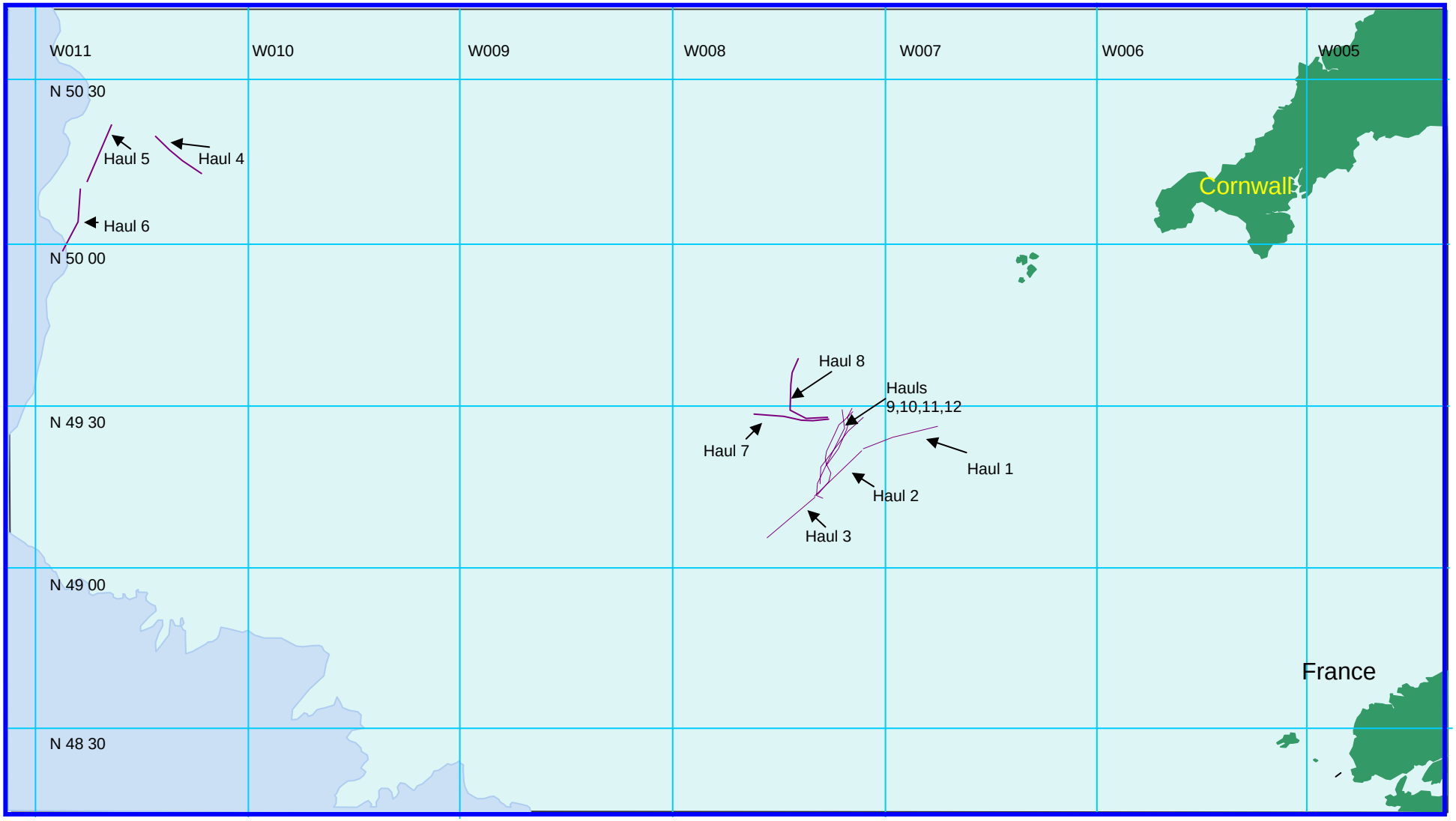


FIG 2

8. Results

The actual weight of fish landed for each trip is very low for the actual time at sea. It has to be taken into account that a major part of the project was to trawl over as wide an area of seabed as possible. Much fishing time was lost moving grounds and with bad weather. The time usage for both trips is shown in the charts below. (Chart 1 and 2)

Trip 1 time utilisation

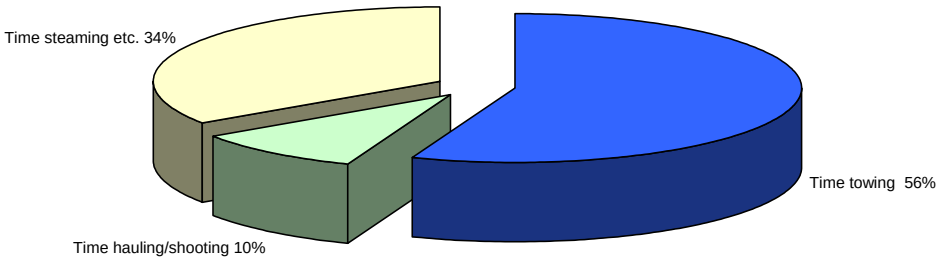


Chart 1

Trip 2 time utilastion

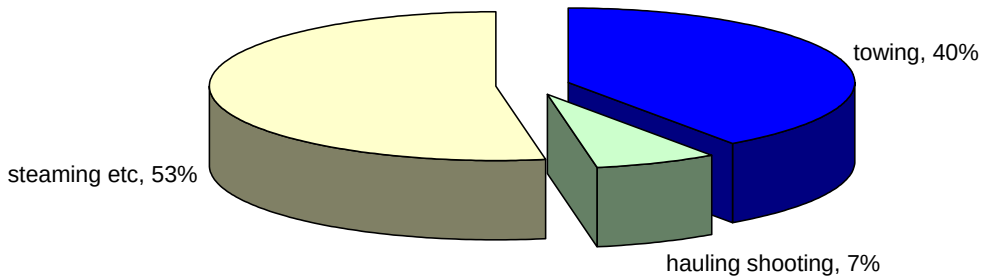


Chart 2

The big increase in the steaming time etc in the second trip was due to the long slow steam west through a full gale for hauls 4, 5 and 6 in the deep water.

In trip 1 the vessel was at sea for a total of 5.6 days (135 hours), trip 2 exactly 6 days with a 26.5 hour turn around between trips in port. This time at sea, and in port landing, are similar to those of the Newlyn beam trawl fleet.

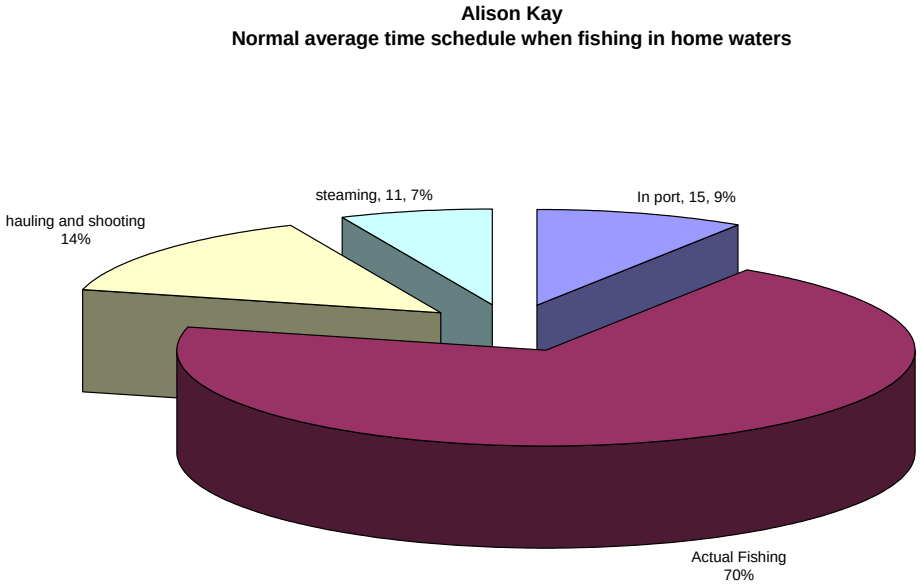


Chart 3

Prior to making the long journey to Newlyn for the sea trials the Alison Kay was grossing in the region of £30,000 to £40,000 for a 7 day fishing trip in waters around the Shetland Islands. Their normal routine would be to return to their home port of Lerwick around mid morning, the crew would then spend the afternoon with routine maintenance, refuelling etc. Prior to the vessel sailing in early evening, the catch would be landed into the refrigerated fish market ready for the auction early the next morning. This is the vessels regular routine working 2 crews, changing over after each weekly landing. This allows the vessel maximum actual fishing time.

A breakdown of the vessels time in an average trip in their home waters is shown in chart 3. It shows that they spend in the region of 70% (114 hours) of the week actually fishing. Usually grossing in the region of £30,000 - £40,000 per trip this averages out at £263 - £350 per hour fishing.

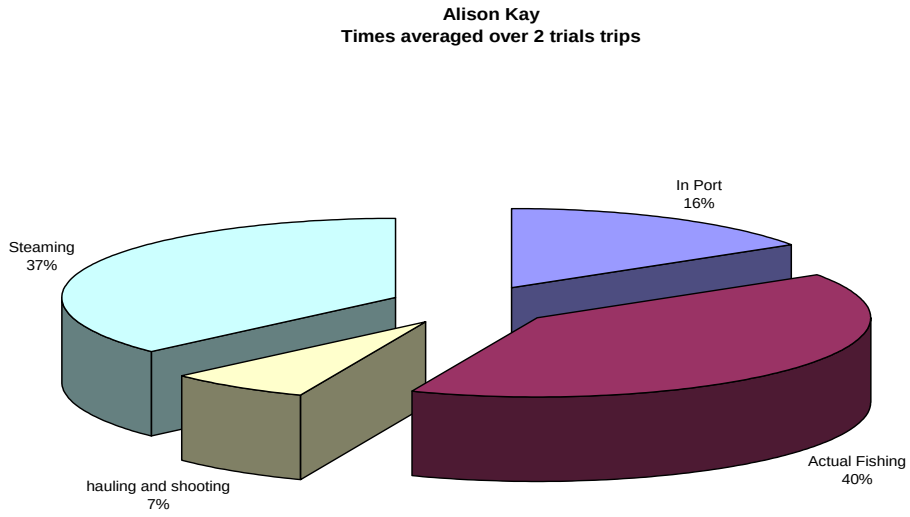


Chart 4

Chart 4 shows a breakdown for the vessels time averaged over the two trials trips on the South West fishing grounds. From this it can be seen that during the trials trips in the South West the vessel actually only managed 40% (67 hours) actual fishing time. The first trip was a little above this at 75 hours and the second trip a little below at 66 hours actual fishing time. A certain loss of actual fishing time is expected in any experimental fishing trials. This is particularly relevant in this project as part of the project was to fish in many different areas resulting in much steaming time. This is in the region of 42% less fishing time compared to the vessels normal routine. The vessels earnings per hour during the SW trials work out at £239 for the first trip and £202 for the second averaging out at £223 for both trips.

Working on these figures if the Alison Kay had managed the same amount of fishing time as is their trips in home waters they could have grossed in the region of £25,500 for each trip. Taking into consideration the lack of knowledge and experience of the South West fishing grounds in relation to twin rig trawling this would have been an acceptable figure. As more experience is gained of the SW fishing grounds in relation to otter trawling and of the seasonal distribution of the higher swimming species more suitable to otter trawling, twin rig could be a viable option for beam trawlers in the South West. Depending on the species mix at different times of the year there may also be a place for single otter trawls with a greater headline height. This would all be dependant on quota allocation being available for these species.

9. Discards

On the whole catches with the twin otter trawl were poor, the majority of the catch being monk fish, megrim, cod and haddock.

If the total retained catch is compared with the discards on a per haul basis, the average discard rate by weight is 43%. This is slightly higher than the mean annual estimations by weight for otter trawlers in 'Discarding in the English Channel, Western Approaches, Celtic and Irish Seas' (2007) by R Enever, A Revill and A Grant. Overall this figure can only be used as a guide as no otter trawlers were sampled for the discard survey in the areas trawled by Alison Kay during these trials. Also as part of the project was to explore different areas, many of these areas were found to be not commercially viable for the twin rigger but did produce many discards. In practice a commercial fishing vessel skipper would tend to avoid these areas preferring to work areas with less discards and more retained catch. It takes many years of experience using a specific type of trawl gear in an area to learn the size and species of fish on the ground at different times of the year. Most discard studies are done at a stage when the fishermen have many years experience in the area. In these trials the skipper was towing his gear at 'random' as far as twin rig otter trawling is concerned, therefore the discard figures from this short trial can only be used as a guide and not as accurate and relevant scientific evidence of discard rates.

Total Retained	Total Discards	**haul number**	% of Discards
406.4	136.0	**1**	25
144.8	323.0	**2**	69
506.7	136.0	**3**	21
265.0	272.0	**4**	51
420.9	442.0	**5**	51
453.3	561.0	**6**	55
386.4	0.0	**7**	0
416.5	1258.0	**8**	75
247.9	340.0	**9**	58
387.4	204.0	**10**	34
389.7	306.0	**11**	44
472.6	374.0	**12**	44
525.9	340.0	**13**	39
321.1	170.0	**14**	35
417.3	238.0	**15**	36
598.0	0.0	**16**	0
674.4	306.0	**17**	31
244.1	96.0	**1**	28
446.4	192.0	**2**	30
338.7	256.0	**3**	43
222.9	288.0	**4**	56
42.4	416.0	**5**	91
64.5	208.0	**6**	76
332.0	320.0	**7**	49
380.6	160.0	**8**	30
531.4	352.0	**9**	40
584.6	288.0	**10**	33
374.8	224.0	**11**	37
479.8	320.0	**12**	40
11076.4	8526.0	totals	43

Chart 5

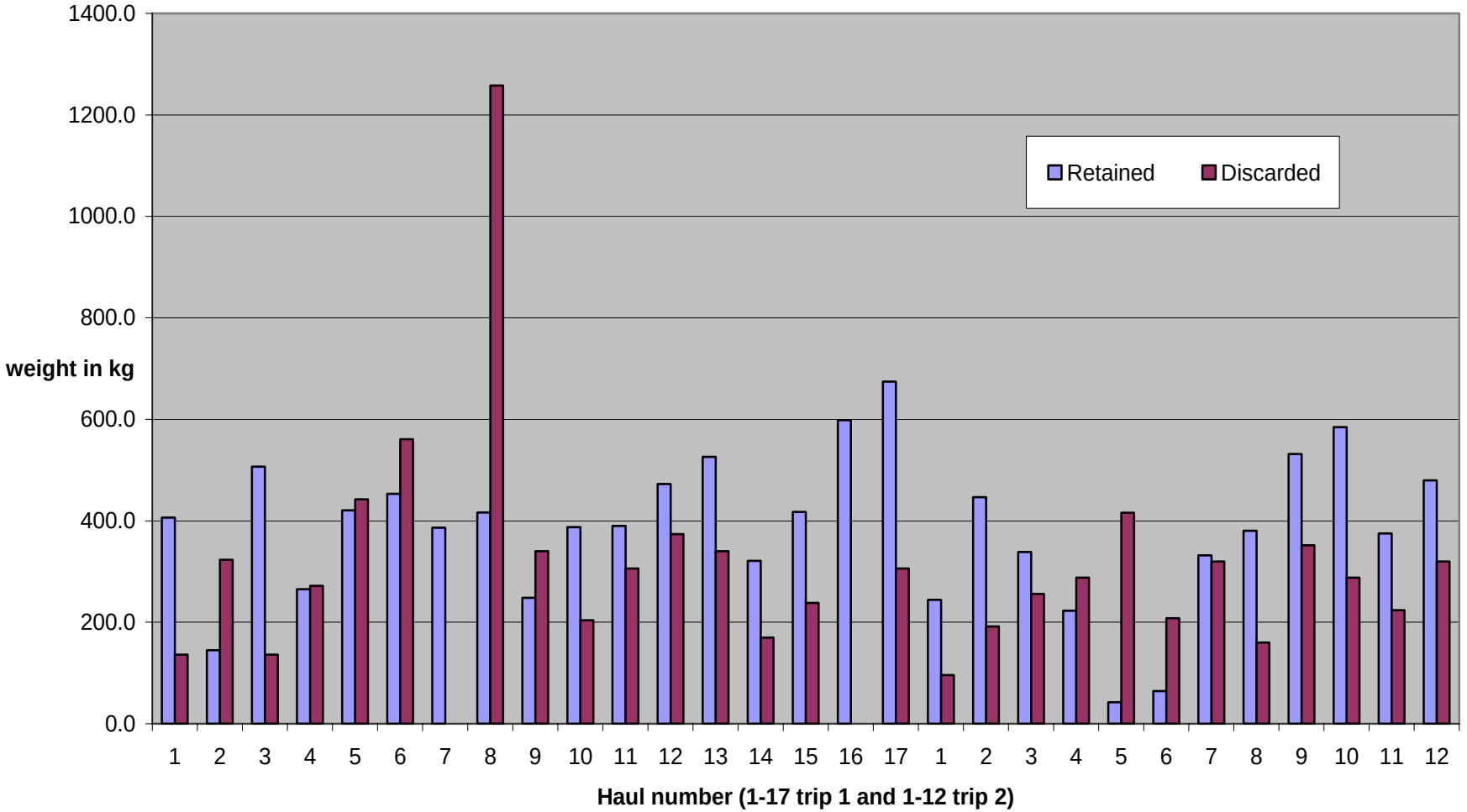
There is a large difference in the proportion of discards in each haul as the gear was towed over different grounds. This can be seen in Chart 5 and 6.

In haul 8 on the first trip there were large catches of boar fish *(Capros aper*). In hauls 4,5 and 6 during trip 2 were in deep water (85 – 95 fathom) where there was only 330kg (live weight or 5 boxes onboard) of retained fish but still many discarded fish (in relation to retained catch). The last 5 hauls on trip 2 were as near a commercial situation as possible during the project. If the discards of these hauls are considered on their own the discard rate drops to 36%.

Over the 2 trips most of the discards (by numbers of fish) comprised of Poor *cod (Trisopterus minulus)* 27%, Boar fish *(Capros aper)* 50% and gurnards *(Trigla spp)* 11%. Haddock, Monk and megrim made up only 2%, 0.01%and 0.4% of the total discards respectively. There were no recorded discards of cod, lemon sole, witch, pollack, ling or saithe.

Chart 6

Total catches per haul
Retained - Discarded



10. Retained Catch

As a result of the different characteristics of the gear compared to the traditional beam trawl of the SW the catch composition is very different. Chart 6 and 7 show the catch breakdown of the Alison Kay's first trip landing compared to a beam trawler that was operating in a similar area at the same time as the sea trials took place.

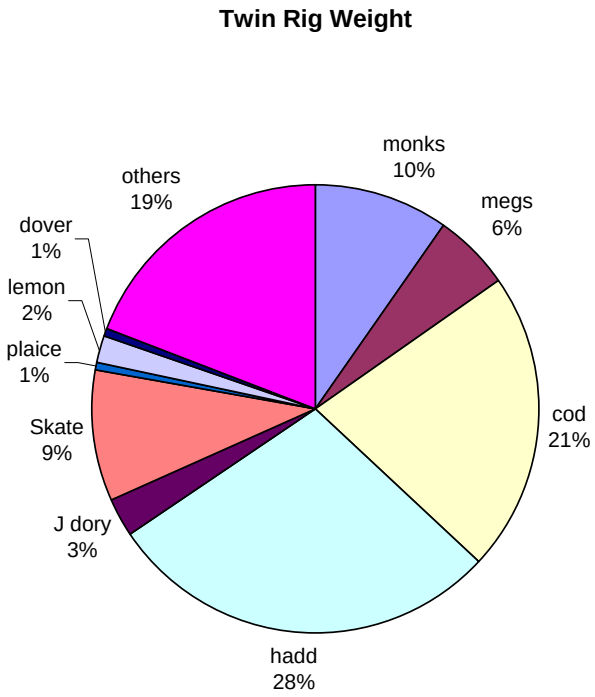


Chart 7

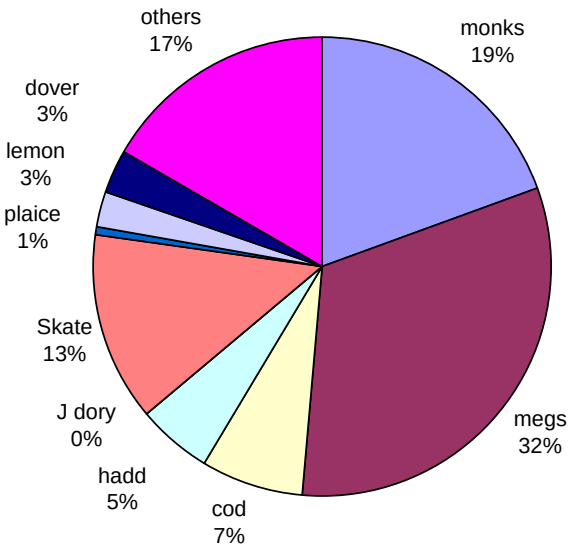


Chart 8

The beamer and twin rigger both have a similar proportion of mixed fish (lemons, skate, congers etc); the difference is in the mix of the 4 main species of monk, megrim, cod and haddock, with the beamer having a much greater proportion of monks and megrims. This is more pronounced in the charts below showing the breakdown of the value of their respective landings.

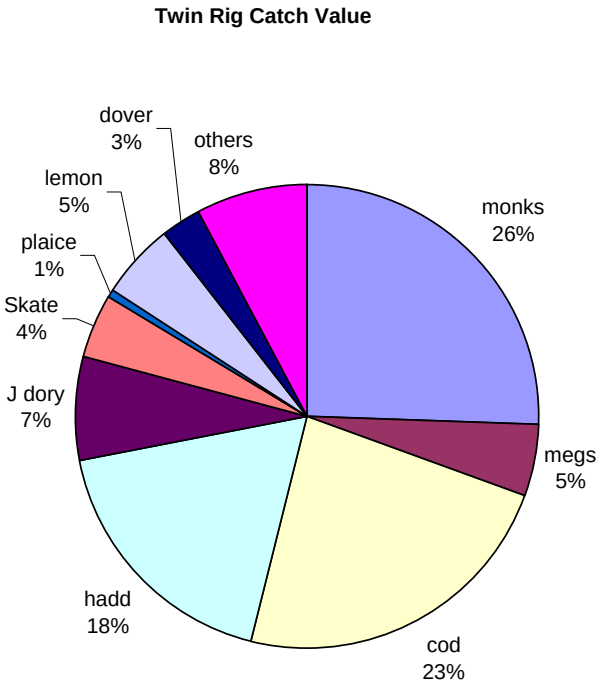


Chart 9

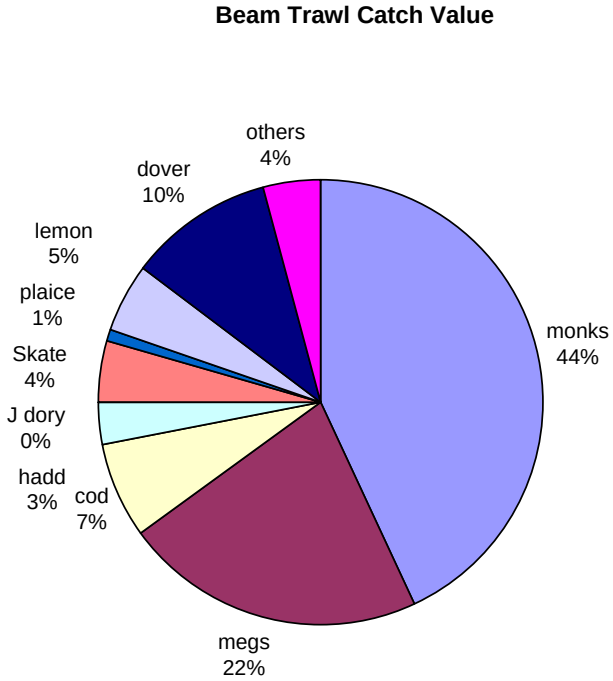


Chart 10

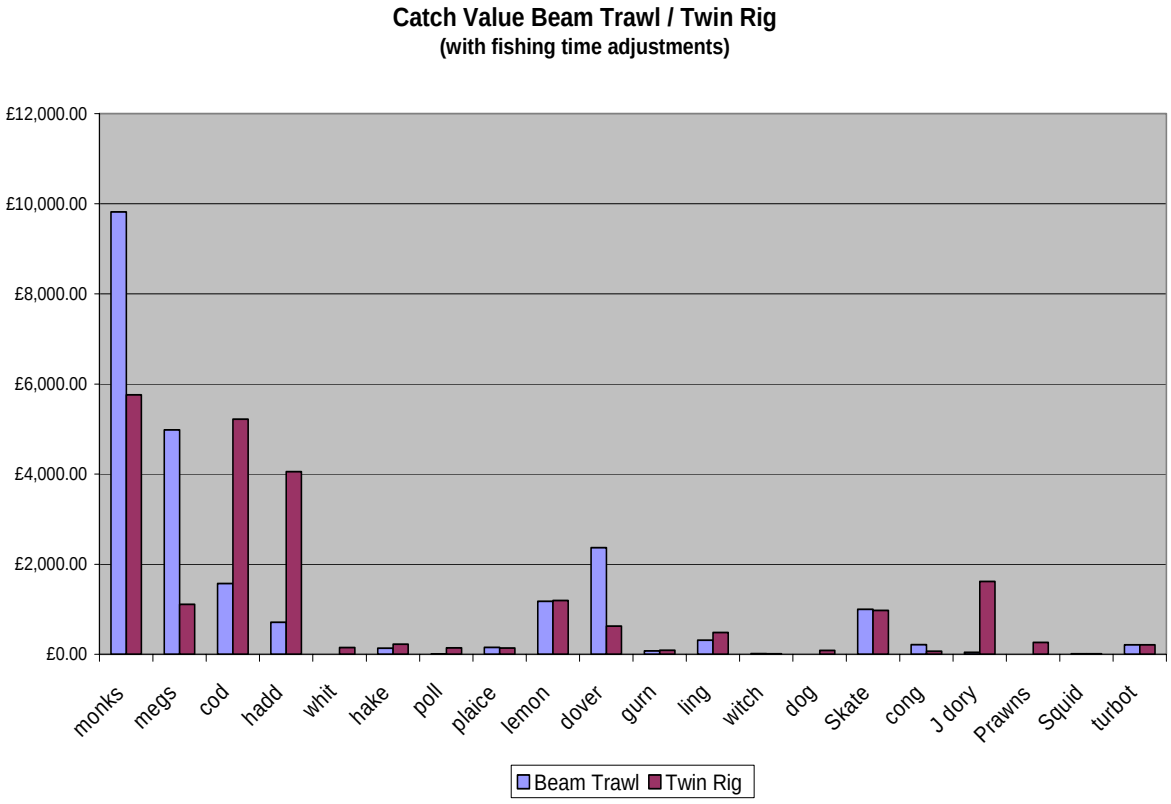


Chart 11

In Chart 6 the catch value of the twin rig vessel is compared with that of the beam trawler. There has been 25% added to that of the twin rig vessels gross to allow for the reduced fishing time compared to that of the beam trawl vessel. It can be seen that the beam trawler is much greater grossing from monk fish and megrims than the twin rig vessel, but the twin rigger has a much greater returns from the higher swimming round fish, in cod, haddock and john dory. This demonstrates how each gear has been developed to target specific fish species.

Chart 12

Weight of retained fish for twin rig vessel per haul (Kg)																					
	haul number	monks	megs	cod	hadd	Whit	hake	saithe	poll	plaice	lemon	dover	gurn	ling	conger	squid	dory	cuckoo ray	dog	comm skate	Nephrops
Trip 1	1	84	16	70	133						3		15	7	15	9	10	23	21		
	2	18	4	18	46									3	10	19	8	11	7		
	3	90	6	98	132				38		14		20	7	33	17	9	7	36		
	4	84	9	36	53						5		16		2	19		5	35		
	5	93	22	84	140						15		18	8		40		0	0		
	6	132	22	122	104						3	6		9	5	14		8	14		15
	7	56	12	73	38				5		2		11	10		16		10	28		126
	8	113	37	118	84		3				2				7	3	27	4	19		
	9	54	18	85	14											2	12	9	38	15	
	10	93	2	75	20		9							15		37			11	126	
	11	90	18	77	147	7	8				2	2		5	9		5	19	0		
	12	105	23	143	115						2	2		5	7			23	49		
	13	180	30	112	75		4				3	7		5	4		17	11	77		
	14	126	19	47	31							5		2		5	8	1	77		
	15	126	26	112	24	8	3					5		7	13	5	23	19	46		
	16	153	24	90	142	26	2			8	11	3		31	15	5	15	35	38		
	17	48	29	85	464		5			8	15			6		0		15	0		
Trip 2	1	126	3	15	60	11	2			2	4	2			14		3			2	
	2	129	25	74	101		8			2		4	6	11	16		21	7		44	
	3	69	27	42	89		10			1	4	2	32		8	8	13	19	6	9	
	4	75	7	30	67	5	10				6		6				5	12			
	5	30	2	0	6													5			
	6	54	4	0			6										1				
	7	153	16	53	23		2			3		5			4		10			64	
	8	132	15	79	23		8					8			28		3	2		84	
	9	128	30	80	168		9				4	5		1	54		16	3		34	
	10	111	28	64	172	18	87					2		8	43		15			37	
	11	96	32	143	0		10					2		58	19		16				
	12	84	20	97	115	5	6	4			4	10		20	48		4	2		63	
totals		2831	527	2122	2589	79	194	4	42	23	99	70	124	217	352	198	238	248	503	477	141

11. Fuel

The average fuel consumption of the twin rig trawler when towing was 131 litres per hour. This is fairy similar to a comparable beam trawler averaging in the region of 135 litres per hour when towing depending on its towing speed.

In both these fishing methods the actual fuel used in towing the gear with both these fishing methods depends greatly on the speed of towing and the drag of the gear being towed. The total fuel usage of the twin rig trawler is irrelevant as at no time during the sea trials could we replicate a typical fishing pattern.

12. Discussion

The standard Scottish twin rig trawling set up has evolved into a very efficient tool for targeting bottom living species on Scottish fishing grounds through many years of gear development and explorations of fishing grounds. The gear has been developed to suit the fishing grounds that it is used on, just as the beam trawl gear of the SW has been developed for SW grounds. It has taken many years of targeting monks and megrims in Scottish waters to find the more productive fishing grounds that suit twin rig trawling at different times of the year.

The project plan was to use the tried and tested twin rig gear that the Alison Kay has tuned to target monkfish, megrims as well as a certain amount of round fish (haddock, cod and whiting etc) on their home fishing grounds to the north of Scotland. Although this gear is very efficient in targeting these species in Scotland it may need to be trimmed in a slightly different manner for the SW grounds to maintain its efficiency. It is a recognised fact amongst fishing skippers and gear specialists that all fishing methods and fishing gear has evolved to suit the local conditions and available fish species. It is very unusual to be able to take one set of gear to a different fishing area and for it to produce good catches immediately. It usually needs much tuning and alteration to get it fishing to its optimum efficiency.

This is demonstrated well when the Alison Kay was fishing alongside the Anglo-Spanish vessel in the tows in the 100 fathom water (tows 4,5,and 6) during the second trip. For the 3 tows, a total of 11 hours towing Alison Kay retained a total of 330 kg of fish. It is now known that this vessel had been fishing consistently throughout its 10 day trip and had good landings from its trip with a much greater catch rate than the Alison Kay. This vessel was using traditional Spanish trawl gear for the area, consisting of one long winged, low trawl with several hundred metres of large diameter sweep between the net and trawl doors to herd the fish into the trawl. This gear has been developed on these fishing grounds over many years. This is quite a different gear set up to that of the Alison Kay twin rig gear.

Although throughout this report comparisons have been made to existing discard data and catch rates of beam trawlers fishing in the same sea areas, these comparisons can only be used as an indication of the discards and catch rates expected with a twin rig demersal trawler. Existing data, for the area, both discard and catch data, has been recorded during previous commercial fishing trips with the vessels concerned, most of these being beam trawlers. During these trips the vessels have been working fishing grounds with proven results of good catch rates at the particular time of the year that the data was recorded. During the twin rig trials with Alison Kay, the tows were undertaken in areas with no past record of catch and

discard rates for a demersal trawler. The skipper therefore could not concentrate his efforts in areas where he expected to get good catch rates with few discards for the particular time of the year, as is normal practice for a skipper. In effect the vessel was shooting at random, as far as demersal otter trawling was concerned. This is similar to the skipper working his home fishing grounds and being asked to ignore his past experience and local knowledge and shoot his gear at random. In this case his catch rates would be much less than normal, probably with a greater number of discards. It would be better to compare generic discard rates for beam trawlers using 80mm codend to that of a twin rig trawler.

Many of the hauls were interrupted by the gear snagging on the seabed, usually the gear was retrieved without much damage, but on several occasions it felt that it was very lucky to get the gear back without loss or partial loss of the trawls. This resulted in a lot of loss of fishing time and reduced catches for those hauls. It is generally accepted by trawl skippers that if the gear becomes fast on a seabed obstruction much of the catch already in the trawl will escape, this can often result in as much as 2/3rds of the catch being lost from the net before the gear is hauled onboard. This is probably more pronounced for round fish rather than bottom living species, therefore has a greater affect on otter trawls compared to beam trawls. Over the two trips with the twin rig gear, a total of 29 hauls, the gear came fast in at least 15 hauls thereby causing considerable loss of catch.

The vessels standard gear for fishing in Scottish waters uses 120mm codend and extension to release as much small fish as possible. Many of these will be fish below the MLS but there will be some loss of fish above the MLS. With restrictions of quota the vessel wants to only to retain the larger fish with a higher sale value. This can be seen when comparing the Alison Kays landings of megrims in Newlyn to that of a beam trawler that landed the same morning. The Alison Kay had 31% of their megrims sold for under £3 per kilo (sale price presumed as a measure of size/quality) realizing 7% of their Grossing for megrims. Of the beam trawlers landing of megrims 47% sold for less that £3 realizing only 18% of their gross for megrims.

It is a well documented fact that a cod end constructed of 120mm mesh will release more small fish than the traditional 80mm or 90mm cod end mesh used by the beam trawl fleet therefore have a much smaller discard rate. The twin rig trawls do not have the same seabed contact as a beam trawl, therefore there should be less benthic debris entering the trawl, this should result in less abrasive damage to the catch while in the cod end and result in better quality of catch on the market. The potential for damage to the catch is compensated for to some respect by the shorter towing time of the beam trawlers, usually only towing for up to 2 hours whereas the twin rig is often towed for 4 – 6 hours. This damage to the catch is more pronounced on the relatively soft fleshed round fish (haddocks, whiting, hake etc) than on the bottom living fish with firmer flesh and more robust skin. (monks, flats etc). This expected difference in catch quality is not particularly evident in the market prices of the twin rig fish. Much of this could be due to the unpredictability of a visiting vessel landing to the market compared to a local vessel that the buyers have experience of, regardless of fishing method.

From the pie chart (chart 8) it can be seen that 51% by weight of the beam trawlers landings consist of monk and megrim, but this makes up 66% of their landings value (chart 10). The twin rig has only 16% by weight of monk and megrims (chart 7), making up 31% of their gross (chart 9). These proportions are only to be expected

as the beam trawl gear has been developed over many years to specifically target monk and megrim on the SW grounds, but this rig is restricted, due to its lack of height, to targeting bottom living species. The twin rig catch of monk and megrim is backed up by cod and haddock (49% by weight and 41% by value) as opposed to the beam trawls only 12% and 10% respectively.

The beam trawler does have a greater catch rate for monks and megrims compared to the twin rig trawler. For the twin rig trawler, 5.8kg per hour for monks, compared to 9kg per hour for the beam trawler. For megrim the figures are 3.38kg per hour for the twin rig compared to 12.5 kg per hour for the beam trawler. It is not relevant to compare the round fish catches between the two methods.

The twin rig with its higher standing trawls, will catch more round fish than the beam trawl. The usual headline height for the type of trawls used in these trials is in the region of 3-4 metres compared to the 0.3 – 0.75 metres for a beam trawl. This opens up opportunities to support the catch of monks and megrims with others species such as the haddock and cod mentioned, provided the vessel has a quota allocation for these species. Also higher value species such as John Dory, of which the Alison Kay landed 152 kilos (£1292) from the first trip as against the beam trawl landings of only 5 kg for £43.

Although twin rig has proved very successful in Scotland for targeting monks and megrim, these vessels rely also on their catch of haddock, whiting and cod to top up their landings. The choice of fishing method depends largely on the target species and the range of species available on the fishing grounds. Many of the Scottish twin rig vessels work on an approximate catch profile of 50% monks / megrims and 50% being round fish, if the expected catch of round fish in an area is a larger proportion than 50% they find that it is more beneficial to use a single demersal trawl with its higher headline to target these species.

Beam trawl is very efficient for catching monkfish, megrims and dover sole but is limited in its ability to catch other species. This is usually due to the fish behaviour before it enters the trawl. It may mean that at certain times of the year beam trawling is still the most effective fishing method, but at other times it may be found that twin rig is more efficient. Indeed if it is found that there are concentrations of higher swimming fish, at certain times of the year, it may be more efficient to use a large single trawl or emulate the French style of semi pelagic trawling. On several days during the sea trials the Alison Kay was within sight of other EU vessels fishing the same waters but it was not known what type of trawling these vessels were engaged in. It may be worth investigating the methods used by these vessels to see if they can be adopted by the local fleet.

It was stated in the objectives of the project that the vessel was to fish on the traditional beamer grounds. With time and experience in the SW a twin rig vessel would probably veer away from these grounds at certain times of the year to fish areas that were more productive for mix of target species usually caught by twin rig trawls.

13. Conclusions and Comments

- **Beam trawl is very efficient for catching bottom living species (monkfish, megrims and dover sole) but is restricted in its ability to catch other species.**

This is usually due to the fish behaviour before it enters the trawl and the height that it swims at in the water column. When any change of fishing method is being considered, it should be remembered that all fishing gear has evolved over a long period of time to target specific species. This has been done by taking into consideration how this target species behave in the vicinity of the respective fishing gear .

- **Twin rig has been developed by the Scottish industry into a very effective tool for bottom living species in Scottish waters. However the basic rig used by fishermen in Scotland may need some modifications to maintain its efficiency for these species in the SW grounds.**

It usually takes several vessels working together in the same fishing grounds, using the same fishing method, to introduce and develop that method into an efficient fishing tool for the area. It will take several years experience using twin rig trawls in this area to enable a trawler skipper to the find the most productive areas at different times of the year. This will need a combination of the skippers own experience and knowledge gathered from other skippers with experience in fishing these SW grounds.

- **Twin rig is more suitable than beam trawling for targeting a broad mix of fish species. It would appear from these trials that there could be a place for twin rigging in the SW.**

With slight modifications to twin rig set up it may be possible to target bottom fish, round fish and Nephrops, or a combination of these at different seasons on different fishing grounds, using the same twin rig gear. This all depends on the viable quantities of target species being located and the fishermen being able to access sufficient quota allocations for the respective species. To some extent it is also dependant on the local fish buyers on Newlyn fish market being able to source outlets for the different species.

- **This trial is just a snapshot of the possibilities of twin rig in the SW offshore grounds.**

It took the Scottish industry many years of development and exploration to open up many of the now commonplace areas for targeting monkfish and megrims in their waters using a demersal trawl. Much of this was done initially using a single scraper trawl. If the skipper of the Alison Kay was asked to fish at random, as was done in the SW, in his home waters its catches would probably be no greater than those in the SW grounds.

- **The trials did demonstrate that there are some haddock and cod of a respectable size in these waters.**

Although there were limited numbers caught during the trials, there was an indication that there may be fishing opportunities for these species in the area if the vessel had quota to catch them.

- **Although twin rig has proved very successful in Scotland for targeting monks and megrim, these vessels also rely on their catch of haddock, whiting and cod for a proportion of their catch.**

There may be viable concentrations of these higher swimming fish that could be targeted with otter trawl (twin and single) in certain areas of the SW grounds that are not normally targeted by SW beam trawlers where.

There are Nephrops grounds that are frequented by French and Irish vessels that could be exploited profitably with twin rig gear by SW vessels if they have the necessary quota allocations.

- **The SW grounds are frequented by other EU fishermen. It would be beneficial to acquire more knowledge on the species these vessels are targeting and the gear that they are using.**

During the sea trials many French trawlers and Spanish trawlers were observed in close proximity to the Alison Kay. More knowledge and understanding of their fishing gear and target species at different times of the year could open up possibilities for otter trawling in the SW grounds.

By using twin rig trawl or a single demersal trawl there may be opportunities to compensate for the loss of monks and megrims by catching other valuable species swimming higher up in the water column such as John Dory.

- **The most appropriate fishing method has to be decided on once the species mix in the fishing area has been assessed**

There may be a place for single otter trawl to target certain species in the SW. Although many vessels in Scotland of comparable size to the SW beam trawl fleet use twin rig there are many vessels that also use a single trawl. These vessels generally target a larger proportion of round fish that swim higher in the water column. There are some vessels in Scotland that have the ability to alternate between twin rig and a single trawl depending on the target species that trip.

- **It may be worth the industry in the SW looking to the Dutch and Belgian beam trawl fleets to see how they have progressed their industry over the past 10 years to cope with the increase in fuel costs and criticism from environment groups.**

Many fleet operators in these counties have looked to Seafish for advice on alternative fishing methods to beam trawls. Many skippers in these countries have taken up twin rig, seine net, out-rig trawling netting or trap fishing. Some skippers have adapted their existing vessels but others, having seen the possibilities of the alternative fishing methods, have invested in new purpose built boats. In most of these situations the skipper has taken the new fishing method and altered the basic set up to suit the grounds that he is fishing on and the target species available on these grounds.

14. Cornish Beam trawl Diversification Project
Alison Kay Wheelhouse Log

Monday 4Th August-

Waited outside Newlyn till 6.00am for high tide at 7.00am. came in , no problems and tied up at 'new pier'. Paul from CFPO and Steve Mosely came down aboard. Cat man fitted new water pump.
Rigged new codend on starboard side net – 2 by 90mm codends
Left Newlyn at 2000 hours
Crew J Anderson, W Johnson, T Laurenson, S Pearson, S Moseley, Gus Caslake, M Montgomerie.

Tuesday 5th August SW F 4

1 Shot 6.55 Lat 49-04-3N Long 6-37W to Lat 49-09-7W long 6-25-8W
Fastened after 3h 11m
very strong tide here filled 0 but 7lobsters, 1 cray and 4 st tails.

2 shot 1000hours Lat 49-08-9N, Long 6-624.6 W to Lat 49-06.5N, Long 6-25 W
Towed ¾ hour then fast, 65 ftm very sticky ---4 lobsters

3 Steamed west of 8 Shot 13.40
Shot Lat 49-06.3 N, Long 6-40.3 W to Lat 49-06N, Long 6-52.9 W
Towed SW with tide then turned NE with tide. 3 ½ hours then fast filled 1 had,1 cod,1 meg,2 skate 1 gurnard.

4 Shot 1823 Lat 49-05.6N, Long 6-52.0W. towed 3 hour 55min --- very poor can't get clear of fasteners. Filled 1 monk,3 tail,1 cod,
Can't seem to get clear working at all, very catchy bottom, not much fish at all.

Wednesday 6th August.

Better day light SW wind Tide easing off a bit.

5 Shot 23.30 on 5th at Lat 48-56.6 N, Long 6-42.8W to lat 48-42N Long 6-56.2 W. Towed SSW all tow, hell of a catchy all through tow. 5 hours 25min for 6 boxes---No fish here--- 1 monk, 3 had, 1 cod, 1 lemon.

6 Shot 0630 Lat 48-43.3 N, Long 7-02W to Lat 48-49.8 Long 6-43.8W. 5½ hours towing filled 11 boxes, 1 monks, 2 had,3 cod,1 meg, 1 skate, 1 conger and 1 gurnard.

7 Steamed up back into English sector18'
Shot 1455 Lat 48-59.7N, Long 7-13.7W to Lat 48-07N, Long 7-13.7W. Got in 4 hours then fastened. Codend on port net over floats. Next to no fish again---9 boxes
Decided to steam west 40mls to Melville Knoll bank.
Absolute waste of time where we have been so far.

Thursday 7th August

8 shot 0557 Lat 49-08N, long8-19.5W to Lat 49-24N, long 8-04 W. Towed 5 hours 50 min. No much use lot of small red fish called Zulus (boarfish) filled 8 boxes 2 cod, 1 meg, 1 skate, 1 hake, 1 dory and 1 conger.

9 Waited till we heard if we could enter Hake Box (ASI?)
Eventually got permission.
Shot 1404 - Lat 49-30.5 long 8-03 to Lat 49-43.6, long 8-11W..
Towed 5 hours NNW to tail of Jones bank.---awful poor—sign of small prawns.
Filled 8 boxes 2 cod 1 meg 1skate.

10 shot 2000 Lat 49-44N Long 8-10.6 W to Lat 49-54.2 N long 8-03 W
Towed up west side of Jones bank met French trawlers (21-24m long, Filled 13 boxes 9 prawns.

Friday 8th August

11 steamed in SW 40 miles, shot at 0803 Lat 49-28.7N long 7-05 W to lat 49-20N long 7-17.7 W
Towed Sw for 4 hours 25min. Don't know if it is slacker tide or better bottom but no catches this haul. Filled 7 boxes 1 monks, 2 hadd, 1 cod 1meg 1 skate, 1 gurnard.

12 shot 1308 lat 49-20.2 N, long 7-17W to lat 49-28.8N, long 7-04.7W.
Filled 9 boxes 3 had, 2 cod, 1 skate, 1 dog, 1 dory, 1 conger.

13 shot 1842. Lat 49-28.4 N. long 7-05 W, to lat 49-20.5 long 7-17.8WPut on sweep again this tow. Better mark, Last tow there was 35k monk . This one 30kilo Filled 7boxes 1 tails 2 had 2 cod 1 meg 1 skate.
4.5 hours.

14 shot 23.47 Lat 49-21.3n long 77-15.9W to Lat 49-30N Long 7-03.7W
Towed north a berth west 5 boxes monks 1 cod 1 meg.

Saturday 9th August

15 shot 0444 Lat 49-29.1N, Long 7-03W. to lat 49-20N Log 7-14W
4 hrs 50 min. filled 8 boxes 1 monks2 cod 1 meg, 1 skate, 1 dory, 1 conger, dover sole

16 shot 0903. lat 49-20.7N long 7-10W, to lat 49-23 N long6051.6W.
6.5 hours filled 11 boxes. 1 monks 3 hadd. 2cod, 1 whit, 1 skate 1 ling 1 squid, 1 dory.

17 shot 16.52 Lat 49-23.4N, Long 6-49W, to Lat 49-24.9, long 6-20.5W
Filled 15 but not that in it –many haddies. Towed east to shorten distance – going to decide tomorrow if we do another week. Not much sign of encouragement to work SW approaches with twin gear.

Sunday 10th August
Arrived Newlyn 1100 after slow run in. .

Monday 11th August 15
Landed 0300

Trip 2

Newlyn 0125
Onboard James, Walter, Stu, Terry, Mike Montgomerie, Mark Edmonds, and Alec Steven.
Heading off for another go!!!
Made £18000—good prices
Sweep still on

1 shot 21.40 at lat 49-26n Long 6-45 W to lat 49-32N long 7-01.6W
Towed 4 hours 21 min into WSW. Poor haul filled monk42k,had 52kg, whit 9.5kg, cod 13kg, lemon 3.5kg, dover sole 2 kg, skate 2 kg.

Tuesday 12 August,
2 shot 0330, Lat 49-23W long 7-02W to Lat 49-13.5 long 7-18.6W
Towed 5 hours 11min. into Sw poor day 70 + fathom. Filled monk 43kg, hadd 84, cod 63, ling 9, 15---, dory 21, meg 24, hake 7, dover 3, 1 plaice, 44 st gurnards.

3 shot SW again0906 Lat 49-13, long 7-19 W to Lat 49-05.3N long 7-33.3W
Towed 5 hours, no use! Poor day from SW now.
Decided to dodge out to edge but after downloading forecast Mike decided we should head for Newlyn.

Wednesday 13 August,
About 0400 downloaded better forecast , so turned and headed for the Irish sector.
Dodged west past Scillies – westerly gale – making 5 kts 105 litre per hour.

Thursday 14th August
Arrived Lat 50-10W Long 10-08W at 0730.
Having to wait for confirmation we can shoot. Don't have booking in number for Ireland.

4 Shot 0940, have no confirmation of derogation but did manage to log in to Irish sector. Lat 50-12N, Long 10-12.8W to Lat 50-19.3N 10-26.3W towed for 4 hours. Very little in it

5 shot 15.36 lat 50-21.2N long 10-39.0W to Lat 49-59.8N long 10-51.4W
Fastened after 4 hours no fish !!!

6 shot 20.33 Lat 50-09N. Long 10-47.6W to lat 49-59.8N long 10-51.4W
Towed ssw down 90 fathom . no fish again. About as bare as I have ever seen it!!!

Steaming 130 back east---bit of an ordeal this lot!

Friday 15th August

7 Shot 17.50 Lat 49-28.2N long 7-36.3 W to Lat 49-27.6N long 7-15.6W
Towed ESE for 5 hours—filled 1 box of monk tails---not much else

8 shot 23.09 lat 49-27.5N long 7- 16.8W to lat 49-38N long 7-24 W.
Towed west but poor night so turned northerly, very poor again. Hauled at 4.10

Saturday 16th August

9 Steamed south 1.5 hours back to where we finished up last trip.
Shot 06.30. Lat 49-29.53N. Long 7-12.0.0W to lat 44-14.9N long 17-03.6.W in 60 ftm poor weather. Hauled at 11.30. -- 1 box skate. ½ dog, 4 haddock,1 monk,1 meg, 1½ cod, 1 conger. – try again.

10 shot 12.40. – lat 49-50.0N long 7-00.0 W - 60 fathom water -5 hours - haul 17.40 - lat 49.29.4N long 7-08.6.W better day now.
1 cod, ½ monk, ½ dog 1 conger, 4 hadd, 1 skate.

11 still in same area – a small mark of haddock and dory - don't know where else to go.
Shot 18.15 at lat 44-29.00N, long 7-09.0W – 62 ftm – wind faired away - hauled at 00.15 – lat 49-12.8N, log 7-19.6W.
1 box ling, ½ dory, 1 monks, 1 meg, 3 boxes cod, no haddock??

Sunday 17th August.

4 shot 01.30 – lat 49-12.6N long 7-17.7W. Haul 07.00 lat 49-27.6N. long 7-05.9W. 5½ hours – not much doing – 2 haddock, 2 cod, ½ meg, 1 monk, 1 skate and ½ ling. -------- Time to go home!!

Trip 1 Weight of Fish Retained KG

haul number	monks	megs	cod	hadd	whit	hake	poll	plaice	lemon	dover	gurn	ling	dog	ck ray	cong	J dory	C skt	Neph
1	28.0	15.0	60.0	115.0					3.0		15.0	6.0	15.0	8.0	10.0	20.0	19.0	
2	6.0	4.0	15.0	40.0								3.0	10.0	17.0	8.0	10.0	6.0	
3	30.0	6.0	84.0	114.0			33.0		13.0		20.0	6.0	33.0	15.0	9.0	6.0	32.0	
4	28.0	9.0	31.0	46.0					5.0		16.0	0.0	2.0	17.0		4.0	31.0	
5	31.0	21.2	72.0	121.0					14.8		18.0	7.0		35.0				
6	44.0	21.0	104.0	90.0					2.5	5.5		8.0	5.0	12.0		7.0	12.5	
7	18.5	11.0	62.0	33.0			4.0		2.3		11.0	9.0		14.0		9.0	25.0	
8	37.5	35.0	101.0	72.0		3.0			2.0				7.0	3.0	26.5	3.5	17.0	
9	18.0	17.0	73.0	12.0										2.0	12.0	8.0	34.0	15.0
10	31.0	2.0	64.0	17.0		7.5						13.0		32.5			10.0	126.0
11	30.0	17.5	66.0	127.0	6.0	7.0			2.0	2.0		4.0	9.0		5.0	17.0		
12	35.0	22.0	122.0	99.0					2.0	2.0		4.0	7.0			20.0	43.0	
13	60.0	29.0	96.0	65.0		3.5			3.0	6.5		4.0	4.0		17.0	10.0	68.0	
14	42.0	18.0	40.0	27.0						4.5		2.0		4.5	8.0	1.0	68.0	
15	42.0	25.0	96.0	21.0	7.0	2.5				4.5		6.0	13.0	4.0	23.0	17.0	41.0	
16	51.0	23.0	77.0	122.0	23.0	2.0		7.5	10.5	3.0		27.0	15.0	4.0	15.0	31.0	34.0	
17	16.0	28.0	73.0	400.0		4.0		7.5	14.0			5.0				13.0		
Total weight of fish	548.0	303.7	1236.0	1521.0	36.0	29.5	37.0	15.0	74.1	28.0	80.0	104.0	120.0	168.0	133.5	176.5	440.5	141.0
	monks	megs	cod	hadd	whit	hake	poll	plaice	lemon	dover	gurn	ling	dog	ck ray	cong	J dory	C skt	Neph
market price	£7.00	£5.00	£2.50	£2.50	£1.20	£3.00	£2.00	£2.50	£5.00	£9.00	£0.30	£2.00	£1.00	£1.20	£0.50	£7.00	£2.50	£5.00
species value	£3,836	£1,519	£3,090	£3,803	£43	£89	£74	£38	£371	£252	£24	£208	£120	£202	£67	£1,236	£1,101	£705
weight in box	45	30	45	45	45	30	45	30	30	30	45	45	45	40	45	30	40	15
no of boxes	12.2	10.1	27.5	33.8	0.8	1.0	0.8	0.5	2.5	0.9	1.8	2.3	2.7	4.2	3.0	5.9	11.0	9.4

Trip 2 Weight of Fish Retained KG

haul number	monks	megs	cod	hadd	whit	hake	saithe	plaice	lemon	dover	gurn	ling	witch	conger	squid	dory	cuckoo ray	dog	com skate
1	42.0	3.0	13.0	52.0	9.5	2.0		1.5	3.5	2.0				14.0		3.0			2.0
2	43.0	24.0	63.0	87.0		7.0		1.5		3.5	6.0	9.5		15.5		21.0	6.0		44.0
3	23.0	26.0	36.0	77.0		9.0		1.0	4.0	2.0	32.0			8.0	7.0	12.5	16.5	5.0	8.6
4	25.0	6.5	25.5	57.5	4.0	9.0			6.0		6.0					5.0	11.0		
5	10.0	2.0		5.0													4.0		
6	18.0	4.0				5.0										0.5			
7	51.0	15.0	45.0	20.0		1.7		2.5		5.0				4.0		9.5			64.0
8	44.0	14.0	67.5	20.0		7.0				7.5				27.5		2.5	1.5		84.0
9	42.5	28.5	68.0	145.0		8.0			4.0	5.0		1.0		53.5		16.0	3.0		33.5
10	37.0	26.5	55.0	148.0	16.0	75.0				2.0		7.0		42.5		15.0			37.0
11	32.0	30.0	122.0			9.0				2.0		50.0		18.5		16.0			
12	28.0	19.0	83.0	99.0	4.0	5.0	3.0		3.5	9.5		17.0		48.0		3.6	2.0		63.0
13																			
Total weight of fish	395.5	198.5	578.0	710.5	33.5	137.7	3.0	6.5	21.0	38.5	44.0	84.5	0.0	231.5	7.0	104.6	44.0	5.0	336.1
	monks	megs	cod	hadd	whit	hake	saithe	plaice	lemon	dover	gurn	ling	witch	conger	squid	dory	cuckoo ray	dog	com skate
average market price	£8.76	£2.95	£3.52	£2.07	£1.66	£2.89	£0.00	£3.57	£8.43	£14.74	£0.75	£1.80	£3.20	£0.25	£0.10	£8.47	£1.54	£0.56	£1.54
species value	£3,465	£586	£2,035	£1,471	£56	£398	£0	£23	£177	£567	£33	£152	£0	£58	£1	£886	£68	£3	£518
weight in box	45	30	45	45	45	30	45	30	30	30	45	45	30	45	40	45	45	45	45
no of boxes	8.8	6.6	12.8	15.8	0.7	4.6	0.1	0.2	0.7	1.3	1.0	1.9	0.0	5.1	0.2	2.3	1.0	0.1	7.5

Sales Sheet for Trip 1(part1)

monks			megs			cod			hadd			whit			hake			poll			plaice			lemon			dover		
kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val
4.0	9.0	36.0	70.0	4.5	315.0	183.0	3.8	695.4	32.0	3.5	112.0	5.5	1.2	6.6	2.0	5.6	11.2	26.0	3.0	78.0	5.0	3.8	19.0	18.0	8.2	147.6	3.0	15.6	46.8
18.5	8.6	159.1	53.0	3.8	201.4	25.0	3.8	95.0	94.0	3.5	329.0	22.5	2.0	45.0	4.5	4.4	19.8	6.0	2.5	15.0	13.5	3.8	51.3	2.5	6.0	15.0	22.0	15.4	338.8
17.5	8.0	140.0	39.0	4.0	156.0	70.0	3.7	259.0	100.0	2.5	250.0	15.0	2.4	36.0	6.0	2.8	16.8	9.0	2.4	21.6	6.0	4.0	24.0	13.0	9.0	117.0	8.0	13.6	108.8
4.5	8.4	37.8	46.0	3.4	156.4	73.0	3.4	248.2	100.0	3.2	320.0	9.0	1.4	12.6	13.0	1.5	19.5			0.0	6.0	3.0	18.0	0.5	3.0	1.5	1.0	6.8	6.8
45.0	8.8	396.0	25.0	1.0	25.0	101.0	3.8	383.8	76.0	3.1	235.6	14.0	1.4	19.6	7.0	0.8	5.6			0.0	1.0		0.0	38.0	8.6	326.8			
68.0	8.5	578.0	21.0	0.5	10.5	170.0	3.8	646.0	103.0	3.0	309.0	7.0	0.2	1.4	8.0	5.6	44.8			0.0				22.0	9.4	206.8			
49.0	8.5	416.5	47.0	0.5	23.5	47.0	3.8	178.6	66.0	3.0	198.0				8.5	5.0	42.5							16.0	8.0	128.0			
113.0	9.1	1028.3			0.0	103.0	3.7	381.1	103.0	2.5	257.5				9.0	2.0	18.0							3.0	3.4	10.2			
46.0	9.2	423.2				47.0	3.0	141.0	103.0	2.0	206.0				4.0	0.3	1.2												
70.0	9.0	630.0				21.0	3.3	69.3	62.0	2.9	179.8																		
50.0	9.1	455.0				46.0	3.2	147.2	200.0	1.8	360.0																		
20.0	8.8	176.0				54.0	3.1	167.4	102.0	1.0	102.0																		
5.0	7.0	35.0				48.0	3.0	144.0	109.0	0.9	98.1																		
6.0	4.0	24.0				48.0	3.0	144.0	50.0	2.0	100.0																		
		0.0				51.0	3.0	153.0	45.0	1.4	63.0																		
						6.5	2.2	14.3	102.0	0.5	51.0																		
cheeks						23.0	3.7	85.1	104.0	0.5	46.8																		
9.5	7.6	72.2				37.0	3.5	129.5	16.5	1.5	24.8																		
		0.0				10.5	3.1	32.6																					
		0.0				18.0	3.0	54.0																					
		0.0				3.0	1.5	4.5																					
AVE	8.8			2.9			3.5			2.1			1.7			2.9			2.8			3.6			8.4			14.7	
526.0		4607.1	301.0		887.8	1185.0		4173.0	1567.5		3242.6	73.0		121.2	62.0		179.4	41.0		114.6	31.5		112.3	113.0		952.9	34.0		501.2

Sales Sheet for Trip 1 (part2)

gurn			ling			witch			dog			thornback			cong			J dory			Prawns			Squid			turbot		
kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val
5.5	3.6	19.8	142.0	2.0	284.0	2.0	3.2	6.4	7.0	1.6	11.2	6.0	1.6	9.6	25.0	0.3	7.5	7.5	8.8	66.0	39.0	2.0	78.0	1.0	7.6	7.6	3.5	12.0	42.0
15.5	2.2	34.1	24.0	1.3	31.2			0.0	75.0	0.4	30.0	7.0	1.6	11.2	5.5	0.1	0.3	30.0	8.8	264.0	60.0	1.2	72.0	39.0	0.0	0.8	3.0	11.8	35.4
76.0	0.3	19.0	43.0	1.5	64.5			0.0	37.0	0.7	25.9	cuckoo ray			34.0	0.3	10.2	41.0	8.8	360.8	61.0	1.0	61.0			0.0	2.0	11.0	22.0
		0.0	4.0	1.0	4.0			0.0			0.0	7.0	1.4	9.8	100.0	0.2	20.0	65.0	8.2	533.0			0.0			0.0	4.5	14.6	65.7
					0.0			0.0			0.0	75.0	0.2	11.3	54.0	0.3	16.2	8.0	8.0	64.0			0.0			0.0			0.0
								0.0			0.0	small eyed						1.0	4.0	4.0			0.0			0.0			0.0
								0.0			0.0	6.0	1.6	9.6									0.0						0.0
								0.0			0.0																		0.0
								0.0			0.0	comm skate																	
											0.0	192.0	1.8	345.6															
												212.0	1.8	381.6															
	0.8			1.8			3.2			0.6			1.5			0.2			8.5			1.3			0.2			12.7	
97.0		72.9	213.0		383.7	2.0		6.4	119.0		67.1	505.0		778.7	218.5		54.2	152.5		1291.8	160.0		211.0	40.0		8.4	13.0		165.1

Total weight 5454 kg Total cash £17,931

Sales Sheet for Trip 2 (part 1)

monks			megs			cod			hadd			whit			hake			poll			plaice			lemon			dover		
kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val
67.0	7.8	522.6	41.0	1.0	41.0	192.0	3.8	729.6	152.0	3.5	532.0	10.0	2.0	20.0	7.0	4.2	29.4	5.0	3.2	16.0	4.0	4.6	18.4	12.0	10.2	122.4	23.0	15.4	354.2
55.0	9.0	495.0	61.0	6.4	390.4	77.0	3.9	300.3	117.0	3.5	409.5	18.0	1.9	34.2	12.0	4.0	48.0				4.0	4.3	17.2	10.0	7.6	76.0	15.0	16.6	249.0
35.0	8.8	308.0	64.0	5.7	364.8	49.0	3.7	181.3	51.0	3.7	188.7	10.0	0.8	8.0	21.0	2.0	42.0				1.0	1.0	1.0	2.0	2.0	4.0			
90.0	9.1	819.0	18.0	5.1	91.8	41.0	3.7	151.7	80.0	3.5	280.0	4.0	0.2	0.8	29.0	0.7	20.3												
46.0	9.1	418.6	16.0	2.7	43.2	152.0	3.5	532.0	50.0	2.9	145.0																		
28.0	9.6	268.8	7.0	1.2	8.4	57.0	3.9	222.3	50.0	2.9	145.0																		
29.0	9.2	266.8				2.5	1.6	4.0	50.0	3.0	150.0																		
13.0	6.8	88.4							54.0	2.9	156.6																		
									27.0	2.0	54.0																		
									50.0	1.8	90.0																		
									70.0	0.5	35.0																		
AVE	8.8			4.5			3.7			2.9			1.5			2.0			3.2			4.1			8.4			15.9	
363.0		3187.2	207.0		939.6	570.5		2121.2	751.0		2185.8	42.0		63.0	69.0		139.7	5.0		16.0	9.0		36.6	24.0		202.4	38.0		603.2

Sales Sheet for Trip 2 (part 2)

gurn			ling			witch			dog			skate mixed			cong			J dory			Prawns			Squid			turbot		
kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val	kg	£	val
3.5	2.9	10.2	91.0	1.6	145.6	2.0	1.5	3.0	4.5	1.5	6.8	13.0	0.5	6.5	123.0	0.4	49.2	30.0	11.0	330.0				1.5	5.8	8.7			
57.0	0.3	17.1							13.0	0.3	3.9	158.0	2.0	316.0	89.0	0.1	4.5	39.0	11.0	429.0				24.0	0.3	6.0			
												102.0	1.5	153.0				25.0	10.8	270.0									
												3.0	1.0	3.0															
												35.0	1.2	42.0															
												25.0	1.5	37.5															
												9.0	0.1	0.9															
												46.0	1.4	64.4															
												144.0	1.0	144.0															
	0.5			1.6			1.5			0.6			1.4			0.3			10.9						0.6				
60.5		27.3	91.0		145.6	2.0		3.0	17.5		10.7	535.0		767.3	212.0		53.7	94.0		1029.0	0.0		0.0	25.5		14.7	0.0		0.0

Total weight 3116 kg Total cash £11545.85