

**Final Report**

**Programme 44: Maximising Economic Returns for the Haddock Fishery by  
Selective Mesh Size in the Under Ten Metre Gillnet Fleet**

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## EXECUTIVE SUMMARY

In a collaborative Fisheries Science Partnership (FSP) Project, Chadfish (Cadgwith, Helford & District Fishermen's Society) and Cefas (Centre for Environment, Fisheries and Aquaculture Science) sought to explore whether fishing with large mesh gill nets is a selective method which does not catch small fish; results in no discarding and no high grading; has low fuel use; and maximises the economic returns of the haddock fishery.

Focusing on under 10 m gill nets in the south west of England, the project:

- sourced and analysed extensive fisheries data sets;
- conducted interviews with skippers; and
- organised a workshop of expert stakeholders including fishermen, scientists, policy makers and fisheries managers.

These activities were used to evaluate the impacts of large mesh gill nets according to:

- selectivity for target species;
- selectivity for size;
- impacts on unwanted by-catch species including mammals and birds;
- impacts on habitats; and
- economic returns from haddock.

Results indicate that the gill nets used to target haddock in the south west of England comprise of large mesh sizes (typically 110 mm mesh) and are highly selective for large haddock, catching individuals mainly from market Grade 3, and above (based on the European Grade structure used in the Fishing Activity Database). In the case of haddock during 2011-13, 42% was Grade 1 and 31% was Grade 2.

Under 10m netting skippers completing the questionnaire asserted that the large mesh nets they use for gadoids had a high proportion of large haddock and very low discard rates of all fish. Discards are mainly associated with fish that are damaged by seals and lice, and lack of quota. Skippers completing the questionnaire also stated that by-catches of marine mammals and birds using large mesh gill nets are rare. These claims were consistent with third party photographic and video material, which showed little evidence of habitat damage (i.e. material hauled up in the gear). Fuel use per trip was also found to be low.

Participants at the stakeholder workshop agreed that fishing with large mesh gill nets is a ‘clean’ fishing method and should be treated as a low risk fishing technique as far as enforcement of the landing obligation is concerned (Jan 2016 onwards). Over 10m trawler operators argued that they were developing more selective methods to eliminate haddock discards since haddock would be a choke species when the landing obligation commences. Any less haddock quota would therefore have a big impact upon their fishing operations. Policy makers and fisheries managers recognise that large mesh nets are highly selective for haddock. However, quota will always be perceived to not be enough and if more quota is given to one part of the industry then it would have to be taken from another part of the industry.

In conclusion, results of data analyses and stakeholder perceptions show that large mesh gill nets are a selective fishing method that has a low impact on the marine environment. The large mesh haddock fishery is relatively selective for species and fish size. Discards, bycatch, fuel use and habitat damage are all relatively low when using large mesh gill nets. Bird catches and marine mammal captures in the haddock gill net fishery are also low (and there are additional precautionary measures available to minimise by-catches of birds and mammals). By supplying their haddock to local and national premium markets (for large fish, and same day or next morning end-user delivery), under 10 m netters in the south west (50% in 2012) are achieving the highest prices for their catch, and therefore are getting maximum returns from their haddock quota allocation (above that achieved by over 10m trawlers for market grades 1 – 3). Overall, the short soak time and premium market routes suggest a general direction of travel to be nurtured for the remainder of the sector (and beyond haddock), whose prices was notably lower. Although the ‘pack and dispatch’ facilities necessary to capture the higher price are relatively modest, we note that not all ports currently have these facilities. Finally, under 10 m gill netters feel that their fishing method meets the criteria set under Article 17 of the CFP basic regulation and therefore should be awarded more quota.

# 1 INTRODUCTION

This report explores whether fishing with large mesh gill nets is a selective method that does not catch small fish; results in no discarding and no high grading; reduces energy consumption and maximises economic returns of haddock. It summarises findings from a desk-based review conducted by Chadfish (Cadgwith, Helford & District Fishermen's Society) and Cefas investigating whether fishing with large mesh gill nets is sustainable for both fisheries and the marine environment. In doing so, this report evaluates whether the under 10 m gill net fleet is maximising the benefits of the haddock quota available to them and, if so, how the quota system might be adapted to reward such selective fishing methods.

The origin of the project is the perception among under 10 m gill netters that they are constrained in their fishing opportunities while they regard their fishing method as 'clean' and exemplary. Given the evidence they believed existed regarding the quality of the fish, the potential added value, and the potentially low environmental impact of gill nets compared to other fishing methods, gill netters wanted to compile all available information on the catch, discarding, and economic returns of this fishery. The idea was proposed to the Fisheries Science Partnership (FSP) by members of the fishing industry.

The objectives of the FSP programme are to build relationships between UK fishermen and scientists and to involve fishermen in the co-commissioning of science. To achieve these objectives, FSP projects focus on:

- Providing information from commercial fishing catches on key stocks to supplement data sources traditionally used in ICES assessments;
- Investigating concerns raised by fishermen on scientific assessments or on stocks not currently assessed;
- Investigating innovative scientific methods and or more selective / environmentally friendly fishing methods; and,
- Supporting the work of Regional Advisory Councils.

Following evaluation by the FSP steering panel, the initial idea was progressed as a full project. An open tender process was conducted and Chadfish was selected to partner Cefas to complete the review.



Chadfish was formed in the 1960s to provide a representative body of fishermen who live and work around the Lizard peninsula. The society is a well-respected organisation and has recently held meetings with the Marine Management Organisation (MMO), Defra, local MP and the Fisheries Minister. The society also manages moorings for fishermen who fish from Helford River. However, it does not hold or manage quota entitlements. The fishermen represented by Chadfish operate a wide range of passive gear including large mesh gill nets, and would have landed the majority of haddock by the under 10m netters during the study period.

## **2 BACKGROUND**

### ***2.1 Under ten metre sector in England***

There are around 2,600 active vessels of 10 metres and under (traditionally referred to as ‘the inshore fleet’) in England (UK Sea Fisheries Statistics 2013). Of these, 23% are between 9 and 10 m in length, 10% are between 8 and 9 m in length while the remaining 67% are 8 m and under.

While the majority of under 10 m vessels operate almost entirely as day boats, a significant number of vessels just under 10 m are designed to possess the catching capacity and characteristics similar to vessels over 10 m. Other vessels (especially those under 8m in length) on the other hand, operate at a different scale and intensity, often with a single crew member and are more limited by weather conditions.

Vessels in the inshore fleet vary greatly in the species they target with some almost entirely dependent on quota species while others target non-quota species. In terms of landings, a greater proportion of non-quota stocks (shellfish mainly), are landed by the inshore fleet (UK Sea Fisheries Statistics 2013). The inshore fleet accounts for 65% of full time employment across the UK fleet. In terms of gears used, 75% of the inshore fleet use passive gears such as pots and gillnets (UK Sea Fisheries Statistics 2013), which have less impact on the seabed compared with mobile gears.

Approximately two thirds of English inshore vessels fish in the English Channel or off the south west coast, and a quarter are based in Cornwall (VIVID Economics 2010). Consequently, the ports most dominated by smaller vessels tend to be in the South West with ports such as Mevagissey, Hayle, Helford and Poole having 10 to 25 times or more under 10 m than over 10 m vessels.

## ***2.2 Inshore fisheries management***

The English inshore fisheries are managed through a combination of the Common Fisheries Policy (CFP) basic fisheries regulations (e.g. quota management) and a number of national and regional regulations (e.g. technical conservation measures). In terms of quota management, the inshore sector does not have individual quota entitlements. The under 10 m fleet quota units are held and managed as a block (known as ‘the Pool’) by the MMO.

The pool of quota along with other stocks not subject to quota restrictions is usually shared amongst holders of under 10 m licences. Those with uncapped licences are allowed to fish up to catch limits set by the MMO or freely for those stocks where there is no catch limit. The MMO uses landings records to estimate how many vessels are likely to land a certain quota stock and what total volume they are likely to land each month. They then allocate catch limits based on these expectations and must make later adjustments to monthly catch limits if more or less volume than expected is landed in any given month. The quota allocation to the under 10 m vessels from the pool cannot be shared, or traded between vessel owners. If an under 10 m vessel were to leave the industry, the owner cannot sell their catching allowance separately since they do not manage their own quota; it is done by the MMO.

## ***2.3 Distribution of quota***

In England, quotas are distributed among producer organisations (POs) based on the number of fixed quota allocation (FQA) units held against the licences of individual vessels or groups of vessels. The FQA units were allocated originally based on vessels’ historic landings (track record) during a fixed reference period (1994 to 1996) for most stocks. During this time, under 10 m vessels were able, but not required, to fill in logbooks and landing declarations and their catch allowance was calculated using grouped estimates based on the best available information at the time.

Since 2005, all first sales of fish landed by under 10 m vessels have to be recorded on a sales note and submitted to the MMO as part of the Registration of Buyers and Sellers (RBS) regulations. The provision of these data to the MMO has indicated that the data used to allocate FQAs substantially underestimated the amount of fish caught by the under 10 m fleet. While the landings data from the RBS have improved understanding of the catching capability of the inshore fleet, it is thought that this has led to lower monthly catch limits per vessel, including some earlier fisheries closures. This has reduced the economic viability of some inshore fishing businesses. It is difficult to tell from the

MMO statistics whether vessels are constrained by monthly limits where fishermen try to avoid breaching limits, and may not pursue a fishery at all if the quota is too limiting.

### **3 OBJECTIVES OF STUDY**

The main objective of this study was to explore whether the under 10 m large mesh gill net fleet in south west England is maximising the haddock quota available to them. This includes exploring whether gill netting sustains fish and fisheries, as well as the marine environment that supports them. This information is required to inform policy makers and fisheries managers on the successful translation of the new CFP policy objective into practice.

The project, conducted in the south west England, aimed to provide answers to the following questions. Is fishing with large mesh gill nets<sup>1</sup>:

- A selective fishing method which does not catch small fish?
- Resulting in low or no discarding and high-grading?
- Maximising economic returns especially of haddock?
- Being used to sustain fisheries and the wider marine environment, as well as minimising other environmental impacts (such as reduced energy consumption)?

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<sup>1</sup> Defined here as gill nets designed to target Haddock with a full mesh size in excess of 100 mm (4 inches) and usually 108 mm (4 ¼ inches), or 115 mm (4 ½ inches) or larger if cod are a significant part of the catch.

## 4 HADDOCK FISHERY IN THE SOUTH WEST

Haddock (*Melanogrammus aeglefinus*) is a roundfish that lives near the bottom, feeding primarily on bottom-living organisms including crustaceans, molluscs, starfish, worms and fish. In the south west, a variety of fishing gears such as gill nets and otter trawls are used to catch haddock both as a targeted species and in mixed fisheries. This study is focused on the under 10 m gillnet fleet operating in the inshore area of the Cornish south coast ICES VIIe, f, g, h. (Figure 1).

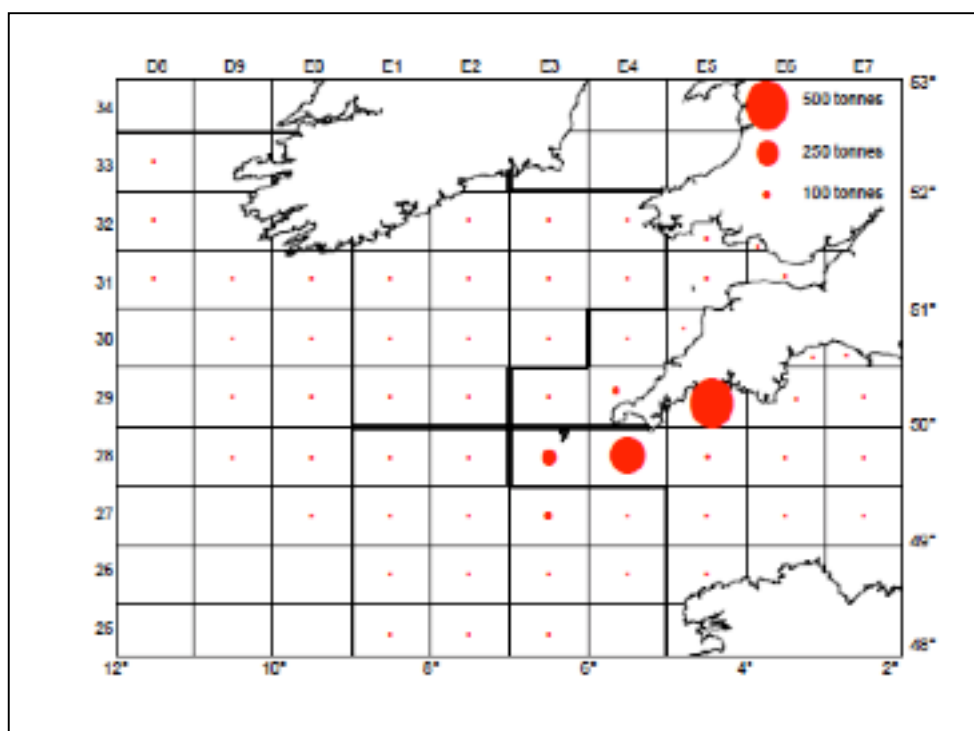


Figure 1: Map of the South West England where the project was based, showing total UK landings (tonnes) of haddock (by the English and Welsh fleet) in 2012. Source: Smith & Catchpole 2013.

Landings data show that the total monthly landings for haddock by the UK fleet was between 100-200 tonnes per month in 2011-2013. Of this, the under 10 m gill and entangling net operators in ICES area VIIId - f landed an average of 2.25 tonnes per month in 2011 and 4.3 tonnes per month in 2012. These landings data indicate that on average 10% of haddock is landed by under 10 m netters, 25% is by under 10 m trawlers while 65% is by over 10 m trawlers (Figure 2).

Many under 10m netters now generate excellent economic returns on their catches as a result of improving quality and reducing environmental impact, but are highly constrained from benefiting from their efforts because of the small amount of quota available to them.

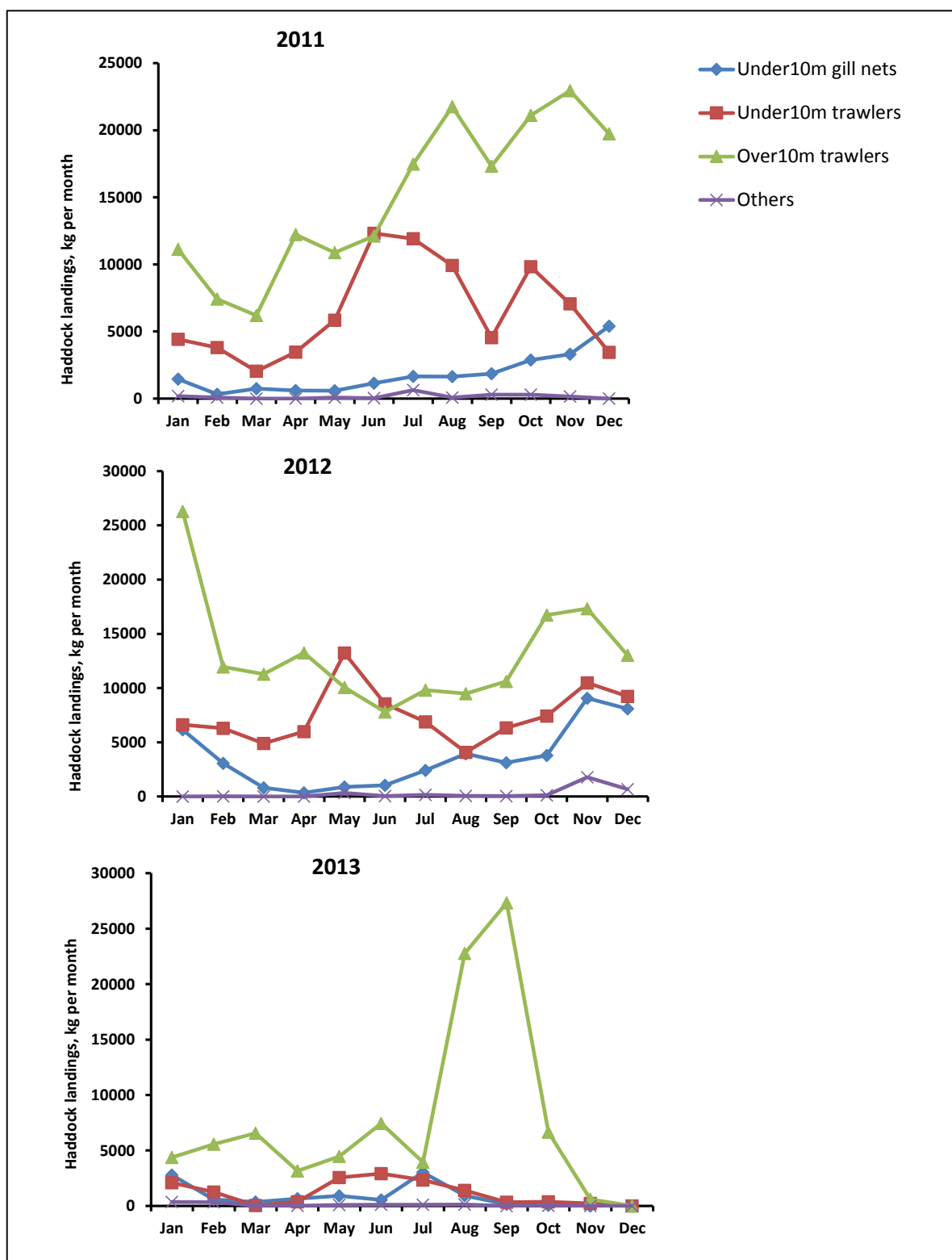


Figure 2. Total landings (kilograms) of haddock per month by UK vessels in 2011-2013 in area VII e – k. Data from fishing activity database (FAD).

## **5 APPROACH AND METHODS**

### **5.1 Data sources**

#### **5.1.1 Skippers self-sampling data (SESAMI)**

The data compiled during the 2012-14 self-sampling in the inshore sector (SESAMI) project were analysed. Skippers of under 10 m vessels collected information during their daily fishing trips including the gear they used, species caught, size, proportion of catch retained and discarded, as well as the reasons for discarding. Based on the grading used at their local landing port, skippers recorded the size (large, medium or small) of each species, and amount caught each day. The data set covered fishing trips conducted by 30 under 10 m skippers between August 2012 and March 2014. In total, catch data from 3,079 daily trips were submitted during the study, of which 49% were by vessels in the south west. Of these trips, 349 or 23% were from skippers who had used gill nets. Cefas observers accompanied a sample of the participating vessels to independently record the catch and collect length data. Observers used standard Cefas discard sampling protocols collecting haul by haul data. The observer trips provided quality assurance and control on the self-reported data generated by the skippers.

#### **5.1.2 Vessels cost and earnings (Seafish)**

The Seafish fleet costs and earnings database which contains financial, economic and operational performance indicators for approximately 30 UK fleet segments was used. Seafish produces the dataset by combining costs and earnings information from vessel accounts provided by vessel owners in the annual Seafish UK fleet survey with official effort, landings and capacity data for all active UK fishing vessels provided by the MMO. The results are produced using consistent methodologies and fleet segmentation criteria so that trends can be determined with confidence.

#### **5.1.3 Weight and value of landings (MMO)**

The Fishing Activity Database (FAD) containing details of landings, ports landed, gear types used and other parameters for specific vessels that fish in the south west England was used. The database includes details of all landings from UK registered vessels and landings into the UK from non UK registered vessels. Given that the objective of the study was to explore whether the under 10 m netters were maximising their economic returns, only landings and catch information for vessels that used gill nets from 2010 to 2013 were extracted from the FAD database and analysed.

#### **5.1.4 Observer database**

Cefas fisheries observers who accompany commercial fishing vessels registered in England and Wales estimate discarding and retention of fish in accordance with the European Commission Data Collection Framework (DCF). The choice of vessels to be sampled is based on fishing effort data taken from the official statistics held by MMO on FAD. In each quarter, a list of vessels fulfilling the sampling criteria are randomly selected and targeted. The discards data from the English fleet includes species, quantities and types of discards, and have been consistently collected since 2002. An estimate was made of the quantities of haddock discarded by each gear type in the south west between 2010 and 2013.

#### **5.1.5 Kernowsashimi**

This small family fish processing business was set up by Chris Bean (skipper of Lady Hamilton) and his son to develop the market for the top quality fish they were landing. Kernowsashimi is a Registered Fish Buyer (RFB), which initially specialised in filling a gap to supply Japanese restaurants in London starting in 2005. Japanese restaurants generally require extremely short soak times and dispatch by direct courier 4 pm on the afternoon of capture for 9 am delivery. The conventional supply chain is too slow from boat to restaurant to fulfil such quality criteria. Kernowsashimi also dealt with the legalities of direct restaurant supply, which is an under-appreciated barrier regarding day boat inshore fishers. It has since expanded to supply other (i.e. not Japanese) premium price London restaurants, created a local restaurant and pub trade within range of an evening run by Kernowsashimi, and also established a regular outlet at both Truro and Helston's Farmers Markets. As a result it has gradually expanded over the last decade as a buyer from other small day boats from Helford, Coverack and Cadgwith who can deliver to them.

Vessels landing to Kernowsashimi need to meet their quality criteria (short soak times, icing and other storage practices, low cosmetic damage) and thereby receive a premium price. The gears operated by the day boats supplying Kernowsashimi include large mesh gill nets for gadoids (haddock, whiting, cod, pollack), smaller mesh gill nets on rocky habitats for red mullet, trammel nets for sole, and tangle nets for angler fish. It is worth noting that no haddock discards have been reported from red mullet netting since these nets are set in very shallow water close to reef or on hard ground where there is no haddock. Conversely, the large mesh gill nets targeting haddock are set in water depths of 60-70 m on mud ground where there is no red mullet. Under 10 m skippers often use several different types of nets to target different species in different fishing grounds. All of these gears also catch spider and brown crab that are cooked and packed by Kernowsashimi

providing a significant income for the skippers. Other species traded include ling, pouting, john dory, plaice, gurnard, wrasse, scad, cuttlefish, smooth hound and lesser spotted dogfish. In addition other boats engaged in mackerel hand lining and squid jigging also supply to Kernowsashimi. Some of these boats are irregular only provide small landings, so Kernowsashimi is an important local outlet to them. Boats that do not land might not do so because they are too far away or because they are unable to change practices. Kernowsashimi actively encourages chefs to come down and go out on their vessels and that in turn has revealed premium markets in unanticipated markets e.g. for the Japanese restaurants, angler fish livers that were previously discarded, scad and wrasse.

As documented later, for haddock in this study period, boats landing to Kernowsashimi accounted for up to 50% (in 2012) of all the haddock landed in the south west England. The employment created at Kernowsashimi since 2005 fluctuates but is around 5 - 10 full time equivalents. Overall, Kernowsashimi provides an interesting example of how small local pack and dispatch facilities might be developed and tailored for the inshore sector.

Data on all haddock landed to Kernowsashimi by a total of nine boats for the period 2011-13 was extracted by EU size grade for use in this project. The price paid to the boats by grade, were also extracted. All of these vessels were under 10 m and the vast majority of haddock will be from large gillnets, with occasional contributions from monk gear.

## **5.2 Performance indicators**

In order to evaluate whether fishing with gill nets sustain fisheries, the marine environment, and economic viability of fishing businesses, indicators of the economic and environmental impacts of gill nets were used. The impacts of gill nets were assessed according to: i) selectivity for target species ii) selectivity for size, iii) impacts on unwanted by-catch species including mammals and birds, iv) impacts on habitats, and v) economic returns (Table 1).



Table 1: Indicators of the economic and environmental impacts that were used to assess the under 10m large mesh gill net fishery in south west England. These indicators were supplemented with video available for two of the vessels landing haddock to Kernowsashimi

Category	Indicator	Data source
Size selectivity	Size of fish caught	SESAMI, MMO, Video, Kernowsashimi landings data
Species selectivity	Species targeted	SESAMI, MMO, Video
By-catch mortality	Discard rates, reasons for discarding, discards of marine mammals and birds	SESAMI, Fisheries observer data, Video
Impacts on habitats	Physical disturbance to the seabed	Skippers questionnaire, Video
Reduced energy consumption	Fuel use	Skippers questionnaire, cost and earnings survey
Economic returns	Catch quality, level of quota	MMO, Seafish

### 5.3 Interviews with skippers

In order to obtain disaggregated data on fishing effort measures, catch composition and depths fished two questionnaires were developed (Appendix 1). The first was for under 10 m gill netters while the second was for trawlers (both under 10 m and over 10 m). In total seven skippers of under 10s in the area using large mesh gill nets filled in the questionnaires. Their opinions of the current arrangements are summarised in this report and set in context. The trawler skippers declined to take part in the study, arguing that the project had been initiated by the under 10 m gill netters in the expectation of a greater allocation of quota. They thought that extra quota allocated to netters would have to be subtracted from their allocation. Fishers using nets might anticipate a favourable outcome, and therefore take part in the interviews. It was hoped that responses of the trawling sector might provide insights and they were therefore invited to take part in the stakeholder workshop.

### 5.4 Stakeholder workshop

A stakeholder workshop was organised to obtain feedback from the wider fishing industry, policy makers, managers and scientists on gill net fishing in the south west and future fishing opportunities. Discussions during the workshop focused on whether fishing with large mesh gill nets in the under 10 m fleet in South West England has the attributes to warrant greater allocation of haddock quota. A summary of the main points raised/discussed during the one-day workshop was made.

## 6 RESULTS

### 6.1 The large mesh gill net fishery in South West England

The Seafish fleet costs and earnings dataset reveals that between 109 and 120 UK registered vessels used gill and other entangling nets across the south west between 2011 and 2013 (Table 2). On average, these vessels measure 8 m in length with a registered tonnage of 5Gt, and spend around 70 days at sea each year. It is worth noting that such small vessels use little power (80kW), because they use static (rather than towed) gear. The Seafish data set suggests that these vessels consume low fuel (98 litres per day at sea) that is used to steam short distances to and from their fishing grounds. However, this figure may be an overestimate for the static gear vessels. For instance, Lady Hamilton (one of the larger vessels with a 90 kW engine), uses 25-50 litres per day. This is because the categorisation used by MMO and Seafish ‘gill and entangling nets’ encompasses a range of gears with specific characteristics for particular fisheries. These gears each have a narrower selectivity of species than the amalgamated data imply.

Table 2: Characteristics of vessels that use gill and entangling nets in south west England

	2011	2012	2013	Average
Number of active vessels	109	120	114	114
Length (m)	7.9	7.8	8.0	8
Power (kW)	79	83	78	80
Registered Tonnage (GT)	5	5	5	5
VCU	61	62	63	62
Days at Sea	70	71	70	71
Vessel Age	21	36	21	26
Fuel Consumption per Day at Sea (Litres)	100	98	97	98

Apart from the large mesh gill nets assessed in this report (typically 110 mm mesh size, 44 meshes deep, 0.5 hanging ratio) that are used to target gadoids (which were primarily haddock during the survey period), the categorisation includes (i) monkfish (angler fish) tangle nets that have a mesh of ~270 mm and typically are left to soak for 2-3 days; (ii) sole trammel nets that have an inner mesh of ~150 mm, and (iii) smaller mesh gill nets with a mesh size under 70 mm, often used by the same

boats to target red mullet<sup>2</sup> and mackerel. Therefore if haddock netters were separated from the data in Table 2 with “no towing” and not restricted by only working neap tides, the fuel consumption would be closer to an average of 40 litres per day and at least 140 days at sea. Neap tides are the cycle worked by most haddock netters as the current on spring tides significantly lowers the efficiency of the gill nets therefore monthly fuel costs are correspondingly lower

The haddock nets used by the south west under 10m gill net fishery are typical and comprise of a headline and a weighted foot line between vertical walls of netting made from mono- or multi-monofilament polyamide. They are generally deployed as bottom set nets at depths of 30 – 70 m usually on muddy or sandy bottoms and therefore do not damage the sea bed. On average, they have a mesh size of 110 mm, with 44 meshes deep, a hanging ratio of 0.5 and are usually left to fish between 6-12 hours (Table 3). These large mesh gill nets are mainly operated with a hydraulic net hauler.

Table 3: Characteristics of the gill nets provided by under 10 m skippers through the SESAMI data set and those provided by CHADFISH skippers through the questionnaire. n = number of fishermen who took part.

	SESAMI n = 13		Questionnaire n = 7	
	Mean	SD	Mean	SD
Length (m)	546	293		
Mesh size	110	40	113	13
Meshes deep (height)	44	12	40	7
Hanging ratio	0.5	0.0		
Twine diameter	0.4	0.1	0.4	0.1
Fishing time (Hrs)	12	6	6	4

Even within the large mesh gill net fishery catching haddock during the survey period, there is considerable variation both in mesh size and soak times. For reasons already described a number of boats, including some of the larger vessels, are now exploiting shorter soak times (2-3 hours).

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<sup>2</sup> supplementary information on the species composition of catches arising these different types of nets for boats operating out of the Helford and participating in this evaluation can be seen in the photo and video documentation available via Pisces, [www.pisces-rfr.org](http://www.pisces-rfr.org)

## 6.2 Species selectivity

South west netters collectively rely on a mixture of quota and non-quota species (Table 4).

Landings data from FAD indicates that the commonest non-quota species by weight are spiny spider crab, smooth hound, edible crab and bass, while pollack, anglerfishes (monkfish) and cod are the quota species that contribute the highest proportion by weight.

Table 4: Contribution (%) of each species to the total weight of under 10 m netters showing a) the 20 commonest species in the catch, and b) 10 commonest quota species in the catch based on data from FAD.

### a) All species

	Species	2011	Species	2012	Species	2013
1	Pollack	18	Pollack	24	Pollack	21
2	Anglerfishes	11	Anglerfishes	13	Edible crab	11
3	Spiny spider crab	10	Spiny spider crab	7	Smooth hound	11
4	Edible crab	8	Cod	6	Anglerfishes	6
5	Cod	4	Edible crab	6	Bass	5
6	Blonde ray	4	Bass	5	Cod	5
7	Ling	4	Ling	4	Thornback ray	4
8	Smooth hound	4	Thornback ray	3	Ling	3
9	Bass	4	Smooth hound	3	Spiny spider crab	3
10	Giant swim crab	4	<b>Haddock</b>	<b>3</b>	Turbot	3
11	Thornback ray	3	Blonde ray	3	<b>Haddock</b>	<b>3</b>
12	Pilchards	3	Mullet	2	Plaice	2
13	Turbot	3	Pilchards	2	Blonde ray	2
14	Whiting	2	Whiting	1	Lesser spotted dogfish	2
15	Small-eyed ray	2	Turbot	1	Scallops	2
16	<b>Haddock</b>	<b>2</b>	Cuckoo ray	1	Mullet	2
17	Mullet	2	Plaice	1	Sole	1
18	Female crab	2	Small-eyed ray	1	Mackerel	1
19	Cuckoo ray	1	Sole	1	Whiting	1
20	Mackerel	1	Lemon sole	1	Small-eyed ray	1

b) Quota species alone

	Species	2011	Species	2012	Species	2013
1	Pollack	39	Pollack	43	Pollack	48
2	Anglerfishes	22	Anglerfishes	23	Anglerfishes	14
3	Cod	9	Cod	11	Cod	10
4	Ling	8	Ling	7	Turbot	6
5	Turbot	5	<b>Haddock</b>	<b>6</b>	<b>Haddock</b>	<b>6</b>
6	Whiting	4	Whiting	3	Plaice	5
7	<b>Haddock</b>	<b>4</b>	Turbot	2	Mackerel	3
8	Mackerel	3	Plaice	2	Whiting	3
9	Plaice	2	Mackerel	1	Brill	1
10	Herring	1	Herring	1	Skates and rays	1

In comparison with the broader data from FAD, the SESAMI data shows that haddock is one of the key species caught by the netters ranking second in overall contribution by weight during the survey period (Table 5). Compared to the over 10 m and under 10 m trawlers where non-quota species comprise 56% and 60% by weight respectively, under 10 m netters rely more on quota species (50% from landings data).

According to the data collected during the self-sampling (SESAMI) project, 55% of the value of catches from under 10 m netters is of quota species (Table 6). Moreover the large mesh gill nets have far higher selectivity than indicated in the overall SESAMI data, where nets for sole, monk and haddock were not distinguished. Haddock is a very good example of a species that can be found on its own on flat muddy ground where gill nets can be highly effective at selecting out the target species (as is evident from the videos described later).

Table 5: Contribution (%) of each species to the total catch of under 10 m netters showing a) the 20 commonest species in the catch, and b) 10 commonest quota species in the catch based on data from SESAMI.

a) All species			b) Quota species alone		
	Species	2012		Species	2012
1	Pollack	14	1	Pollack	25
2	<b>Haddock</b>	<b>11</b>	2	<b>Haddock</b>	<b>20</b>
3	Spiny spider crab	10	3	Anglerfishes	14
4	Anglerfishes	8	4	Cod	8
5	Blonde ray	5	5	Turbot	7
6	Female crab	5	6	Mackerel	7
7	Cod	4	7	Ling	7
8	Turbot	4	8	Cuckoo ray	3
9	Mackerel	4	9	Whiting	3
10	Ling	4	10	Herring	2
11	Lesser spotted dogfish	4			
12	Edible crab	3			
13	Giant swim crab	3			
14	Bass	2			
15	Cuckoo ray	1			
16	Whiting	1			
17	Bibs	1			
18	Herring	1			
19	Painted ray	1			
20	Dogfishes	1			

Table 6: Overall contribution (%) of quota species to catches of various fleets showing data from FAD and SESAMI.

Year	Under10m netters		Trawl/seine	
	FAD	SESAMI	Over10	Under10
2011	47		44	41
2012	56	55	38	36
2013	45		51	42
Average	49	55	44	40

## 6.3 Size selectivity

The landings data held on FAD include the size grade for some of the common species in the catch such as haddock. These landings use the European grade structure for fish size. The official community grading rules (1990), define Grade 3 as being 300-570 g, Grade 2 as being 570 g -1 kg, and Grade 1 as being 1 kg and above. However, on some UK markets these grades are split into further grades. For instance, at Brixham haddock is market Grade 3 when it weighs between 550 g and 1 kg, while at Plymouth market it is considered Grade 3 when it weighs between 570 g and 1 kg. All haddock landings to Kernowsashimi over the past 6 years have been submitted through the Registered Buyers and Sellers (RBS) according to EC grades, as is instructed in the current RBS Handbook. The grading reported here is therefore based on the grades used in the FAD data set.

On average, 53% of the catch (all species) landed by all under 10 m netters between 2011 and 2013 was comprised of large fish (Grade 3 and higher) compared to 58% of the catch from under 10 m trawlers (Table 7a). Landings of haddock from ICES area VIIe-h by size grade, on the other hand, show that overall, 83% of the haddock landed by under 10 m netters were Grade 3 and above while 71% of the haddock landed by under 10 m trawlers was of similar grade (Table 7b). The average percentage composition for under 10 m netters between the years 2011 - 2013 was 42% for Grade 1 compared to 20% for the under 10 m trawlers (Table 7b). Similarly, 31% of the haddock catch for under 10 m netters was Grade 2 compared to 24% for under 10 m trawlers showing that under 10m netters land a higher proportion of large haddock than under 10m trawlers.

Table 7: Market grades of the catch landed by under 10 m netters and trawlers in south west England showing the % composition for each grade for a) all species in the catch and b) haddock only.

### a) All species (and size)

Grade	Under 10 m gill nets				Under 10 m trawl/seine				Over 10 m trawl/seine			
	2011	2012	2013	Average	2011	2012	2013	Average	2011	2012	2013	Average
1	10	11	19	14	8	14	23	15				
2	24	31	24	27	18	28	23	23				
3	11	19	9	13	12	26	22	20				
4	2	6	4	4	10	12	12	11				
5	1	3	0	1	2	2	1	1				
Not graded	52	30	43	41	50	18	20	29	100	100	100	100

b) Haddock only

	Under 10 m gill nets				Under 10 m trawl/seine				Over 10 m trawl/seine			
Grade	2011	2012	2013	Average	2011	2012	2013	Average	2011	2012	2013	Average
1	7	43	75	42	1	21	38	20				
2	39	31	22	31	16	28	27	24				
3	24	8	1	11	22	34	26	27				
4	6	19	2	9	16	18	9	14				
5	0	0	0	0	0	0	0	0				
Not graded	24	0	0	8	45	0	0	15	100	100	100	100

The self-collected data by under 10 m skippers (SESAMI) indicate that 85% of all haddock caught were large (Grade 1; >2kg for an individual fish) (Figure 3).

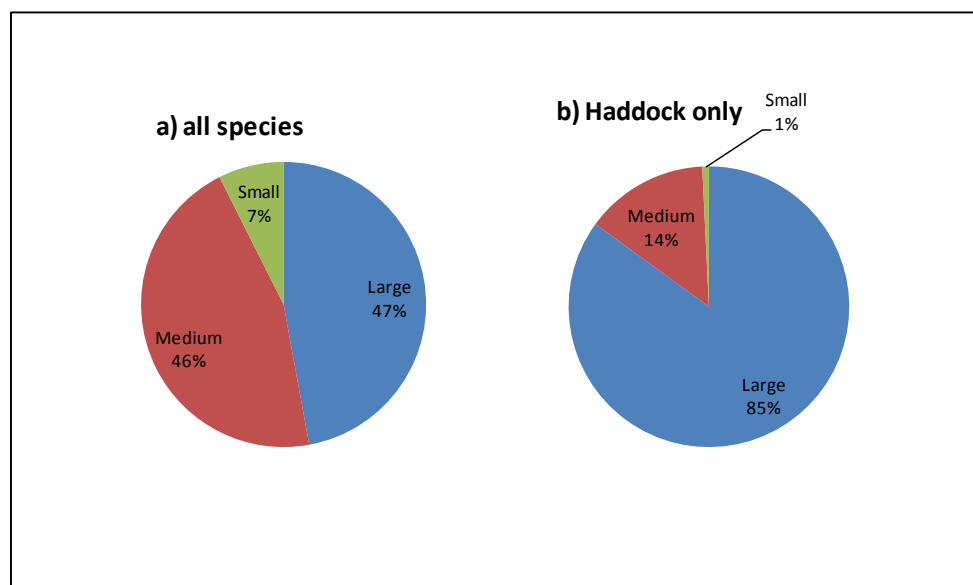


Figure 3: Size of a) all species and b) haddock only landed by under 10 m netters in the self-sampling (SESAMI) project showing the proportion that was large, medium or small. These data were collected during August 2012 to August 2013.

Most of the catch from over 10 m trawlers was ungraded and therefore is not presented in Table 7. However, data collected on the performance of four different trawl configurations compared to standard trawl design to eliminate Area VII haddock discards using an over 10 m trawler (Smith



and Catchpole, 2013)<sup>3</sup> show that the average size of haddock in the standard commercial trawl and experimental trawl configurations all peaked at around 40 cm (~630g Grade 2), with very few fish larger than 50 cm (1.3kg Grade 1) or smaller than 32 cm (~310g Grade 3).

## 6.4 Discards

Data collected by on-board fisheries observers show that in comparison with the over 10 m fleet and under 10 m trawlers, the under 10 m netters have the lowest discards rates of haddock in the south west (Table 8). The data self-collected by skippers during the SESAMI project show that 7% of caught haddock was discarded due to a variety of reasons. These include: i) the catch was damaged by conger eel, seals or were rotten (95%); and ii) lack of quota (5%) (Figure 4). In some instances, skippers reported that when the weather is bad some nets could be left out at sea for several days. When such nets are hauled, some of the fish were rotten. For vessels with shorter soak times (2-3 hours), weather related incidents or rotting fish are not relevant. .

Chadfish wished to produce comprehensive video monitoring as part of this project but the budget was limiting. Instead, they provided third party links to [videos](#) and [photo documentaries](#) indicating that damage from predators can spoil some catch from the large mesh gill net fishing boats documented here. Typically, discards are saved for pot bait or, if there is little left, discarded.

Table 8: Mean proportion (%) of haddock discarded by various fleets fishing in south west England. Source: Cefas Observer database

Gear	Vessel length	2011	2012	2013	Average
Gill net	Over 10m	4	2	21	9
	Under 10m	0.0	0.1	0.0	0.0
Otter trawl	Over 10m	27	13	24	21
	Under 10m	3	2	3	3
Multi rig trawl	Over 10m	16	17	27	20

Additional observations in Forster & Smith (2011) indicate that survival rates of gadoids in red mullet gill nets when returned to the sea was 83% for cod, 92% for pollack, 100% for pout and only 20% for whiting, although they also cautioned that this was an opportunistic result from research set up for a different purpose. These results are likely similar to the vessels discussed here with similar

<sup>3</sup> [http://www.cefas.defra.gov.uk/media/625804/mf056%20report\\_final.pdf](http://www.cefas.defra.gov.uk/media/625804/mf056%20report_final.pdf)

(2-3 hr) soak times. The study was carried out on board Lady Hamilton within the same time period and season and is further demonstration that red mullet have no discards for haddock. However, as already presented, discards rates in the large mesh gill nets are very small.

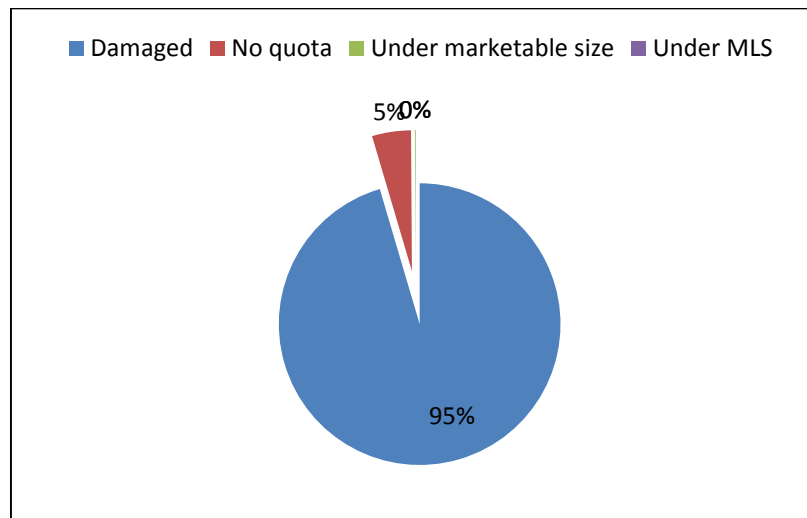


Figure 4: Reasons for discarding haddock provided through self-reported data by under 10 m netters in south west England

Respondents to the questionnaire stated that by-catches of marine mammals using large mesh gill nets are rare. The skipper of Lady Hamilton for example, has participated twice in extensive trials of cetacean pingers and recorders with The Cornwall Wildlife Trust on both monk tangle nets and large mesh gill nets and did not catch any cetaceans (see Pisces website for [first trial](#), 1<sup>st</sup> May 2009; [second trial](#) 16<sup>th</sup> October 2012). As a precautionary measure, some vessels currently use cetacean pingers on monk nets that have longer soak times, but not on the short-soak time large mesh gill nets because the risk of catching cetaceans is considered to be negligible. The Chadfish gill netters do not regard any nets that they operate as having significant catches of large animals. Monk nets have however, been occasionally reported to catch young, presumably less experienced, seals raiding the nets. The skipper of Lady Hamilton stated that for the first time in many years' experience, he caught a basking shark (dead when released) in his monk gear in February 2015.

Data from the questionnaires also indicated that by-catches of birds in large mesh gill nets are rare. Responses from the questionnaire in this project indicate that one under 10m large mesh gill netter had discarded one herring gull in the last 3 years while another indicated that he had discarded two guillemots. Notably, there are no large cliff breeding colonies in the area.

Again it is important to be aware of gear distinctions. Large mesh gill nets tend to be set further offshore than smaller mesh red mullet nets, where the risk of seabird capture might be considered greater. The FSP report on selectivity trials of smaller mesh red mullet gill nets on board Lady Hamilton (Forster & Smith 2011)<sup>4</sup> noted no by-catches of cetaceans or birds even though numerous sightings of birds diving around the nets were recorded. The highest recent bycatch of seabirds by Lady Hamilton was during the long stormy period of January-February 2014, when red mullet nets set in sheltered areas caught anomalous numbers of shag and guillemot.

## 6.5 Economic returns

Quota allocation data from the MMO show that between 2011 and 2013, around a third of the haddock quota allocated to under 10m pool in ICES area VII b - k was allocated to the under 10 m netters in the pool (Table 9).

Table 9: Weight (tonnes) of haddock in ICES area VII b - k landed by UK under 10 m pool vessels from 2011 to 2013. The figures include the weight of leased quota landings. Source: MMO.

Gear	ICES area	2011	2012	2013
Gill nets and Entangling nets	VIIId	0.0	0.1	
	VIIe	15.4	41.9	25.2
	VIIIf	11.7	9.6	3.0
	Total	27.0	51.6	28.2
Other gears	VIIId	0.0	0.0	2.3
	VIIe	72.0	92.3	43.3
	VIIIf	10.8	13.4	10.6
	VIIg	0.3	1.4	0.0
	Total	83.1	107.1	56.2
Grand total		110.2	158.7	84.4

As stated above some under 10 m netters may rent quota from third parties. These figures therefore do not necessarily represent the full amount of quota used by south west netters. The quota received however, was used to generate ~£41,000 per year of revenue to the vessel owners (Table 10) over the 3 years.

<sup>4</sup> [http://www.cefass.defra.gov.uk/media/464417/fsp\\_2010\\_11redmulletselectivityreport\\_final.pdf](http://www.cefass.defra.gov.uk/media/464417/fsp_2010_11redmulletselectivityreport_final.pdf)

Table 10: Changes in first sales value (£) of haddock by month between 2011 and 2012. Source: FAD data.

	2011			2012			2013		
	Gill net	Trawl/seine	Trawl/seine	Gill net	Trawl/seine	Trawl/seine	Gill net	Trawl/seine	Trawl/seine
	Under10	Under10	Over10	under10	under10	Over10	Under10	Under10	Over10
Jan	1793	4487	10544	8384	8165	26790	6277	4149	7369
Feb	544	3287	7174	3858	8829	12398	1172	1941	8467
Mar	1330	1868	7000	1142	5779	9566	649	69	10244
Apr	1077	3443	11107	596	9640	16035	1344	544	6111
May	1141	6025	9550	1876	19283	10965	1910	3920	7907
Jun	2052	15601	10938	2267	14956	11710	1266	4262	10816
Jul	1939	12357	16551	5191	10204	13815	7634	5074	7494
Aug	2708	12701	24855	7186	6240	13015	2353	2844	32790
Sep	2818	6501	22414	6188	9633	14268	336	591	40092
Oct	4425	13918	25664	4192	13389	27133	190	846	10631
Nov	5498	9462	24804	14955	19436	29979	5	725	1831
Dec	8002	6225	25855	10917	12586	13951			1
Total	33326	95876	196457	66751	138140	199626	23136	24965	143752

Table 11 shows that the average prices achieved by the under 10m netters for haddock are slightly higher than those received by the under 10 m trawlers. These prices include landings to Kernowsashimi which generally fetch a significantly higher price. As already stated, some of the under 10 m netters have developed their own marketing arrangements to sell their haddock. Such organised and enhanced marketing arrangements have led some of the under 10 m netters to generate a higher profit compared to under 10 m trawlers (Table 12).

Table 11: Prices achieved (£/tonne) of haddock by fleet and by market grade. Kernowsashimi landings, which make up a substantial proportion of the total under 10 m netting landings, are given separately. Source MMO and Kernowsashimi.

Market Grade	Kernowsashimi Under 10m Netters				All Under 10m Netters				Under 10m Trawlers			
	2011	2012	2013	Average	2011	2012	2013	Average	2011	2012	2013	Average
1	3,644	3,016	2,947	3,203	2666	2070	2306	2,347	2508	1972	2197	2,226
2	2,799	2,306	2,588	2,565	1755	1741	2247	1,914	1830	1756	1968	1,851
3	2,196	1,812	1,865	1,958	1358	1327	2858	1,848	1448	1419	1305	1,391
4	1,138	969	935	1,014	734	1266	1149	1,050	653	1055	936	881
5					451			451	434			434
Ungraded	1,143	675	1,093	970	1719	1396	1304	1,473	1315	513		914

Table 12: Costs and earnings per vessel for different fishing fleets in south west England showing values between 2011 and 2012. Source: Seafish costs and earnings data set.

	Under 10m nets				Under 10m trawlers				South west beamers (Over 10m)			
	2011	2012	2013	Average	2011	2012	2013	Average	2011	2012	2013	Average
Landings (Tonnes)	25	23	23	24	28	34	27	30	234	278	278	264
Fishing Income (£)	39624	37457	40921	39334	62668	72816	60939	65474	687808	694822	686839	689823
Fuel (Litres)	3838	3969	3768	3859	9656	10457	8843	9652	224652	236502	232810	231321
Days at Sea (#)	70	71	70	71	88	92	80	87	220	235	238	231
£/days at sea	564	525	581	557	713	788	760	754	3126	2957	2883	2989
Crew share (£)	11375	7950	8841	9388	18236	21845	18093	19391	181111	174673	172317	176034
Total costs (£)	28794	24711	26584	26696	50290	61797	51620	54569	637033	652159	643806	644333
Gross value added (£)	26107	23781	26547	25478	32281	35924	29972	32726	238738	244193	241950	241627
Operating profit (£)	14732	15831	17707	16090	14046	14079	11879	13335	57627	69519	69633	65593
Net profit (£)	11416	11447		11431	9656	8377		9016	40811	53644		47227

## ***6.6 Market value added by premium market for under 10 m large mesh gill netters***

During the course of this study, the significance of some of the under 10 m netters who have developed their own marketing arrangements where they sell haddock at a significantly higher price became apparent. For instance, haddock (and other fish) caught by the skipper of Lady Hamilton (C. Bean) and Lucy Marianne (A. Hoskin) is usually supplied directly in the local area to caterers, at their own farmers market shops in Truro and Helford, to sushi outlets and higher-end restaurants in London under the business name, Kernowsashimi. Even if trawlers were acting as day boats the conventional supply chain would need to be modified to get the fish up to London speedily. Further, cosmetic quality is important (i.e. abrasion damage in trawls) so the changes required to supply the niche market may not be worth developing for a fishery primarily geared to high volume fisheries.

Analyses were therefore completed on the entire individual day boat data from Kernowsashimi for the three years (2011-2013) to compare the price achieved by these vessels and under 10 m trawlers (Table 11, Figure 5). Results show that the vessels landing to Kernowsashimi are getting significantly higher value for the larger haddock. Due to the premium markets supplied, Kernowsashimi prices differ for large sized fish thereby encouraging under 10 m netters (suppliers) to use large mesh nets. Market data from Kernowsashimi also shows that a significant proportion of total haddock landings for the under 10 netters (50% in 2012) was landed by Kernowsashimi vessels implying that the prices of haddock received by that sector of the under 10m netters are very good, indicating a general direction of travel for the sector.

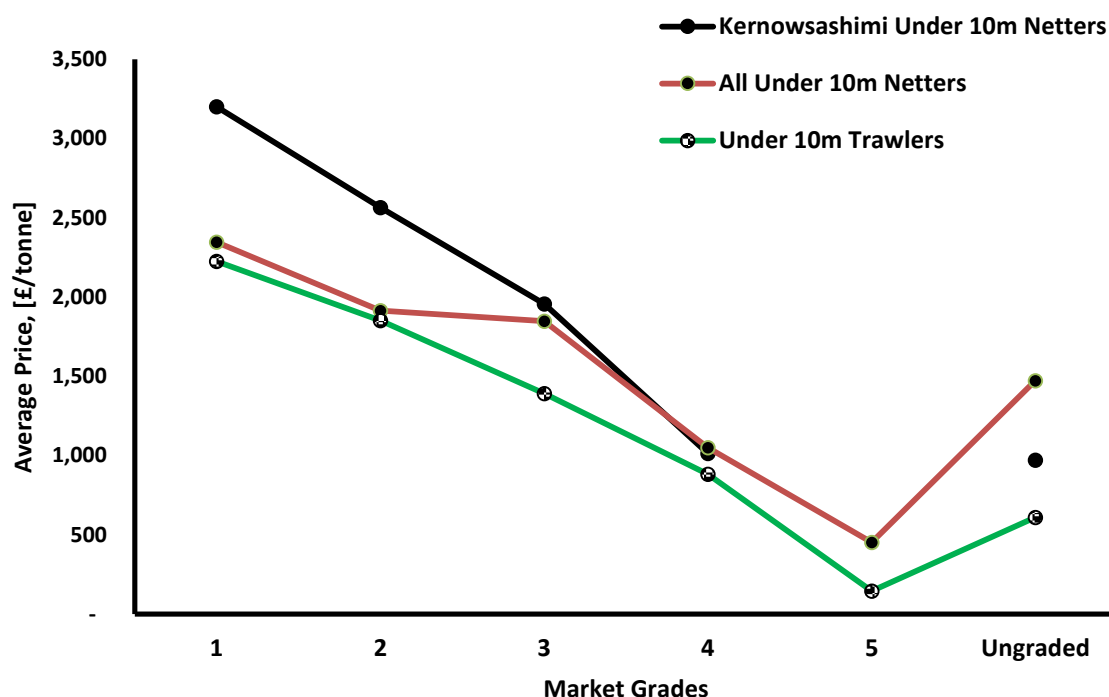


Figure 5: Price (£ per tonne) achieved for haddock by different fleets and by market grades. Note that the ‘All Under 10m Netters’ category includes data from vessels that land to Kernowsashimi.

## 6.7 Stakeholder Workshop

A one-day workshop was held at the New Continental Hotel in Plymouth where policy officials, regulators, skippers, industry leaders and scientists took part. A copy of the agenda and list of participants is given in Appendix 2. The following section highlights the key points raised during the official workshop minutes discussions.

### 6.7.1 Selectivity of large mesh gillnets

- Skippers felt that through this project they had demonstrated that large mesh gill nets were a selective fishing method. The issue was how best to take the findings forward, or whether they would be taken forward.
- It was also recognised that the (relatively low) discarding in the under 10 m large mesh gillnets was not because the gear is not selective but mainly to do with damaged fish (by seals, lice) and lack of quota.
- Participants at the workshop agreed that fishing with large mesh gill nets is a clean fishery and therefore there is no need to have cameras on board to monitor discards because

discarding is not an issue with the under 10 m netters. Fishing with gill nets should be treated as a low risk fishing method as far as enforcement is concerned when the landing obligation commences (Jan 2016 onwards).

- Skippers of under 10 m vessels using large mesh gill nets indicated that they felt they should receive more haddock quota since they fish relatively selectively. They also felt that the overall economic impact of e.g. taking a small proportion of haddock quota from the over 10m trawlers and giving it to the under 10m netters would be small as they start from such a low base, and their actual capability to catch more is quite limited compared to other métiers.
- It is not clear how many over 10 m vessels would be constrained by smaller haddock quota as the vast majority of south west vessels land some haddock based on quota availability. However, the main vessels which land a significantly amount of haddock include the Crystal Sea and Tranquility, and two Northern Irish vessels which have access to more quota either through FQAs or swaps/leases. Over 10s argued that if more haddock quota was to be transferred to a selective fishery (under 10 m netters) then this would create a choke fishery for the over 10s as they couldn't catch all their quotas for other species.

#### **6.7.2 Quota allocations**

- Policy officials at the workshop stated that they regarded the current quota allocations to be consistent with Article 17 of the CFP basic regulation.
- As far as the current quarterly distribution of the pool quota is concerned, it was noted that the scheme has been better for some stocks e.g. haddock but not for others e.g. skates and rays.
- The workshop also recognised that every decision made on quota allocation will have winners and losers. Quota will always be perceived to not be enough.
- Lessons from last year (regarding rays and skates quotas/catch limits) mean that quota allocations will be managed on the basis of current levels as opposed to expecting that some more quota can be sourced from elsewhere e.g. from other member states.

#### **6.7.3 Comparisons between under 10 m netters and over 10 m trawlers**

- It was argued that under 10 m netters are able to change fishing methods if they catch all the haddock allocated to them e.g. they can change from the large mesh gill nets to monk nets, sole nets etc. For trawlers however, haddock is a choke species so if they catch their



allocation then fishing has to stop. This is why haddock is such an important fishery as far as the discard ban is concerned.

- It was recognised that haddock is also extremely important for gill netters as it provides them with the highest economic returns such that they had changed fishing methods and even métiers because they cannot access enough haddock quota to enable them continue fishing with the large mesh gill nets. However, there is no reason why over 10s should not do the same, and indeed if there was no change in fishing behaviour that would defeat the purpose of Article 17.
- It was also stated that while the over 10 m are able to move to other fishing grounds where there is less haddock, they usually do not move because it is not economically viable. The fishing grounds within range of the under 10 m netters targeting haddock, on the other hand are very limited and therefore under 10 m skippers cannot move easily.
- It was also suggested that while the over 10 m trawlers can get e.g. 70 tonnes to catch haddock between grades 1 - 4 (improve selectivity), under 10 m skippers could not apparently be awarded 3 - 4 tonnes to land grades 1 – 2 at a higher price per kilogramme. The extra quota requested by the under 10 m netters is a small quantity of the overall amount given to the over 10s.
- One way forward with the quota distribution is to set up an inshore producer organisation (PO) mainly for the under 10 m vessels. The workshop was informed that both the South West Producer Organisation (SWPO) and Interfish were happy for the under 10 m fleet to run as a PO. Area VIIe could make a start with the PO idea for the under 10s.
- The over 10 m fleet also has challenges, and argued they also need more quota especially with the landing obligation in which haddock will be the main choke species. They felt they had already put a lot of effort exploring more selective trawling gears. So they feared that less quota has a big effect to the over 10s and anything less than the current allocation will lead to changes in fishing operations being necessary.
- It was therefore indicated that the landing obligation will drive the industry to catch large haddock, although this will be a problem mainly for the over 10 m trawlers.
- It was said that while there are incentives to the over 10 m trawlers to adopt more selective fishing practices due to the forthcoming landing obligation, there was a lack of incentives to adopt selective fishing techniques for the under 10 netters. An alternative view was that the under 10 m netters were already well underway improving fishing techniques and gaining market value.

#### **6.7.4 Policy issues related to quota allocation**

- It was stated in the workshop that policy makers face a difficult situation where if they give more quota to one part of the industry, it then means they have to take that extra from another part of the industry.
- Some participants at the workshop felt that the quota issues being discussed should not be about over 10 m and under 10 m fleets, or fishermen but rather about changes in gears and metiers and a mixed fishery versus targeted fishery for haddock. The focus therefore should be on how quota is used to increase selectivity in unselective fisheries.
- Quota uplift and TAC – it is unclear how quota uplifts will be undertaken (e.g. will fleets that do not discard, and so had already adopted best practice, be penalised by having no quota uplift?) but it was assumed that the extra quota will be distributed based on current laid down procedures. Quota uplifts will go to member states not the fishery, which led the under 10 m netters ask whether it was possible for them to have a greater share of the quota uplift.
- Policy makers and managers at the workshop stated that they understood what the under 10 m netters were trying to achieve but indicated that it was not an easy task.
- Relative stability: If a Member State demonstrates that a fishery is clean, would they get a higher quota allocation? It was suggested that the under 10 m netters could use the report from this project to negotiate a higher TAC next year.
- The workshop was informed that it has not yet been decided whether haddock will come under a landing obligation in 2016. It was also stated that there were indications that the TAC for haddock may go up next year.

## 7 DISCUSSION

### 7.1 *Policy implications*

The aim of this project was to inform fisheries managers and policy makers on the potential characteristics of large mesh gill nets for species and size selectivity, the impact on other species including mammals and birds, the wider impact on habitats, and wider environmental issues like fuel use, as well as the economic returns. The data analysis, perceptions of Chadfish skippers and discussions at the workshop all indicate that large mesh gill nets are a selective fishing method that can be used to sustain the marine environment.

The results from this study are also relevant to the new Common Fisheries Policy (CFP) especially Article 17 of the basic regulation and the landing obligation. Under 10s are generally limited to a few miles from their home port, and come back to harbour each day. They can make a virtue of that necessity by emphasizing low volumes, high quality and low environmental impact, and so obtain higher prices. There is then a natural synergy between them and over 10 m vessels that can go further out to sea for several days. The over 10s may not attract the top premium prices, but do have economies of scale and volume. The under 10m netters have been successful in their reorientation, but have run up against limited quota availability. Our overall recommendation is that the Government use the results of this study to help resolve the haddock quota distribution issue using transparent and objective criteria as it seeks to implement the new CFP.

It was suggested that the government is now aware of the potential of the inshore premium quality fisheries, but still lack awareness of its scale (and so lack of quota) and its added value. Under 10 m skippers therefore hope that this study illustrates actual added value that can be achieved, but also that that expansion in Cornwall and elsewhere is being severely limited by lack of fishing opportunities. While more haddock quota allocation to the under 10 m netters could be modest in terms of overall quota requirements, it would be significant in terms of the money per tonne of landed fish.

### 7.2 *Benefits of video*

Chadfish proposed to use video and other means to gather detailed information from the vessels for this project during the 2014 season but funding for this was not available. Anticipating criticism of the absence of routine video footage, Chadfish believes this demonstrates that static gear vessels feel they have ‘nothing to hide’. There is a continuing willingness to explore the routine use of

video to confirm selectivity and discarding characteristics of this fishing gear and method. Skippers would like video data to be collected and systematically used, routinely assessed and understand fish abundance. This illustrates the importance of nuance: if data is gathered and simply “sits in a box” as part of an enforcement policy on discarding, this will generate little enthusiasm (see Workshop discussion). If the same video is gathered for positive reasons e.g. to aid stock assessments, development of better gear, provide visual evidence to policy makers of the strengths and weaknesses of different methods (which vary markedly in their characteristics—a point not always appreciated) demonstrating what the fishers are convinced is a good story to tell, then there is more interest. Such use has resource implications (even if skippers cover costs of equipment, there are the demands of dealing with the data even for demonstrating ‘positive’ use), but some skippers have offered to host pilot projects.

Two of the vessels in this study (FH214 Lady Hamilton and FY 239 Lucy Marianna) along with others not involved in large mesh gill net fisheries have participated in third party monitoring (*Pisces*). Photographic and video data since 2004 and 2009 respectively selected by *Pisces* as representative of the operation of these (and other) gears are already available on the *Pisces* website. However, for this project, in anticipation of concerns of possible bias in edited highlights, all available uncut video has been compiled and placed on YouTube as part of the *Fishface* project. A drop box link to the [Fishface Interim Report](#), including links to the videos, and a running script of events as the nets are hauled, is available. In addition, a [short video](#) was prepared for the workshop, showing the various types of netting, and clips of poor, average and good hauls from Lady Hamilton and Lucy Marianna taken from the videos in the *Fishface* report.

Overall, the video material provides supportive evidence that:

For fish stocks

- There are very low rates of discarding - only a couple of fish were discarded over all four videos;
- The method is selective;
- The size and condition of fish are of premium condition.

For wider environmental impacts

- There is little evidence of seabed habitat damage (no material in nets);
- That the incidence of seabird and marine mammal bycatch is not significant - none in the videos

Chadfish skippers are open to reporting of bycatch of marine mammals and seabirds, convinced that they have everything to gain from such better reporting.

### **7.3 Stock Status**

During this project, the under 10m netters have stressed that they have used large mesh monofilament gill nets to fish for gadoids (rather than particular species) for at least a decade. The principle species caught are whiting, pouting, ling, pollack, haddock and cod. These gadoids have shown enormous sequential fluctuations in abundance. Over the last decade, netters have experienced peaks, initially of cod, then of large whiting in 2009, and then of haddock which peaked in large mesh gill net catches around 2012 before subsequently declining to 2014.

The larger than average haddock recruitment in 2013 (ICES Advice) were not prominent in catches in 2014 but would become so in 2015 if present on the grounds. Views from under 10 m netters indicate that such an abundance of haddock in VIIe is unusual, as is also evident from ICES Advice. Therefore such variability needs to be taken into account when management measures are drawn to maintain haddock (or any other stock) in an unnatural condition (unnaturally high, or unnaturally constant) especially as this has knock on effects on the ability to catch other gadoids that may in turn be temporarily abundant.

## 8 CONCLUSIONS

Some consistent themes running through the project based on the data analyses, interviews and stakeholder workshop are summarised below. These include

- Results from the data sets and stakeholder perceptions reveal that large mesh gill nets (110 mm mesh size, 44 meshes deep, 0.5 hanging ratio) are a selective fishing method. While there is a considerable variation both in the mesh size and soak times within the large mesh gill net fishery, the majority of gill nets used to target haddock by under 10 m fleet can be described as large mesh nets.
- Gill nets ensure practices that have less impact on seabed habitats and which are specified to catch certain sizes of fish, in this case large meshes allowing the targeting of mature fish rather than juveniles, as currently encouraged by policy makers.
- The under 10 m fleet in the south west using large mesh gill nets have the lowest discards rates of haddock. While discards of fish under the minimum landing size tend to be common in other fleets, discards in the under 10 m netters are rare and mainly where catch is damaged by seals and lice. By-catches of marine mammals and birds when using large mesh gill nets are also rare, and precautionary measures are available.
- Marketing arrangements such as those developed by Kernowsashimi have allowed skippers of under 10 m netter fetch premium prices for their haddock. These have led to netters getting maximum returns on their haddock quota. Other Chadfish netters, for various reasons, use the conventional supply chain. Outside of this area Pisces, for example, has documented other fishers, who have developed or are developing similar arrangements for gaining premium prices, including Pinney's of Orford and the Eastbourne Fishermen's Protection Society.
- The small size of the fishing vessels, engine power, low fuel consumption, low discard rates, and short soak times makes the large mesh gill nets a highly selective fishing technique with low impact on the marine environment. Such properties mean that it could sustain the marine environment.

## Appendix 1: Questionnaire that was used to gather data from under 10 netters in Chadfish.

Your name:..... Date:.....

### Q1. Details of the vessel you use

Vessel name:	RSS No:	PLN:
Vessel length (m):	Age of vessel (years):	Engine power (kW):
Tonnage (GT):	VCU:	Main port:
Number of crew (including skipper):		

### Q2. Your top three main gear types

Gear type	% of time you have used each gear in the last 2 years	
	2013	2012
1. Static nets (haddock)		
2. Static nets (other)		
3.		

### Q3. The nets you use to target haddock

Net name	Twine type	Mesh size	Twine diameter	No. of meshes deep	Foot rope	Head rope	Average soak time
1.							
2.							
3.							
4.							
5.							

### Q4. The depth at which you deploy your haddock nets

	Depth					
	0-10m	20-30m	30-40m	50-60m	60-70m	Over 70m
% of time (effort)						
Muddy bottom						

% of effort in:	Sandy bottom						
	Rocky bottom						

Q5. Regarding your haddock gillnets only

The top five species you catch	% value of retained catch in the last 2 years	
	2013	2012
1.		
2.		
3.		
4.		
5.		

Q6. The top ten species you discard in your haddock nets.

Your top ten species	% weight discarded as a proportion of total catch		
	2013	2012	Reasons for discarding*
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

\* Indicate the reason the species is discarded using the following codes:

1 when the species is discarded because it's under minimum landing size

2 when there is no market for that species

3 when it's damaged (*please indicate what caused the damage*)

4 when it's under marketable size

5 when it is of good size but no quota

6 when it's a banned (protected) species



Q7. The number of birds and marine mammals you discard in your haddock nets.

	Number discarded each year		
	Species name	2013	2012
Birds	1.		
	2.		
	3.		
Marine mammals	1.		
	2.		
	3.		

Q8. Please provide your average costs attributed to haddock fishing effort in each of the last two years.

Costs could include:	2013	2012
Commission		
Harbour dues		
Subscriptions & levies		
Shore labour		
Fuel & oil		
Boxes		
Ice		
Crew travel		
Food & stores		
Quota leasing / buying		
Crew share		
Insurance		
Gear replacement		

Q9. Which regulation (if any) has had the biggest financial impact on your business in the last 3 years? *Please rank them from the one with highest impact to the one with lowest impact.*

Q10. How do you think the amount of haddock quota allocated to you has affected your fishing business?

Q11. What do you think would be a fair way of distributing haddock quota?

Q12. Moving away from haddock, what are the most important factors that have affected your financial performance in the last 3 years? *Bear in mind time is a cost. Please rank the factors from most important to least important.*

Q13. Please feel free to provide any other comments

## Appendix 2. Stakeholder workshop

### a) Workshop agenda

#### OPTIONS FOR THE DISTRIBUTION OF HADDOCK QUOTA

**Date: Thursday 22<sup>nd</sup> January 2014**

**Where: New Continental Hotel, Plymouth**

11:00	Arrival, tea and coffee	
11:30 – 11:45	Welcome and introductions	Chris Bean
11:45 – 12:05	Project background and approach	CHADFISH / Cefas
12:05 – 12:30	Update on distribution of quota	MMO
12:30 – 13:00	Questions / viewpoints	
13:00 – 13:45	Lunch	
13:45 – 15:00	Discussions on gill net selectivity and haddock quota distribution	
15:00 – 16:00	Wrap up and conclusions, next steps and how things will be taken forward.	Chris Bean / S Mangi

### b) Workshop Participant list

Steven Eglintine – MMO

Julian Roberts – MMO

Andy Carroll - Defra

Dale Rodmell – NFFO

David Stevens – Skipper, Crystal Sea

Dave Cuthbert – NUTFA

Chris Bean – Skipper, Lady Hamilton

Stephen Mangi – Cefas

Danny Philips, Skipper, Scorpio

Graham Searle, Skipper, Emma Louise

Anthony Hosking, Skipper Lucy Marianna

James Roberts, Skipper, Bonny Grace

Ivor Henry, Skipper, Peter John Two