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SEAFISH ECONOMIC ANALYSIS

UK vessels dredging for king scallops in ICES Area 7

Economic analysis of UK vessels dredging for king scallops in ICES Area 7

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1. EXECUTIVE SUMMARY

Since 2012 there has been a cap on the annual number of days at sea that 15m and over scallop vessels can dredge in ICES Area 7, as part of the Western Waters Management Regime (WWMR). In response to requests by industry and government, Seafish analysed the economic performance of UK vessels that dredge for king scallops in Area 7. The analysis also includes Area 7 under 15m vessels for comparison purposes, as requested by industry and government. The analysis uses fishing activity and economic data of UK vessels that landed any amount of king scallops from Area 7 during a calendar year within the period 2008 to 2015.

Vessels that dredged for Area 7 king scallops are classified into three length groups with different characteristics and activity patterns: under 10m vessels, 10 to 15m vessels and 15m and over vessels. Smaller vessels tend to fish in inshore waters, while larger vessels operate in more distant areas and move between fishing grounds.

The total number of vessels landing any amount of Area 7 king scallops (caught by dredging) in a calendar year ranged between 238 and 320 during the period 2008-2015. Over 10m vessels increased during this period, from 137 to 195 vessels.

The three length groups of vessels show different levels of reliance on king scallops as a source of income. Larger vessels, 15m and over, are highly reliant on king scallop for income. Under 10m vessels landed a wide variety of species and 10-15m vessels landed a wide mix of species in 2008 but became increasingly reliant on king scallops for income each year up to 2015.

Total effort in Area 7 by scallop dredging vessels increased from 2008 to 2011 and then decreased from 2012 to 2015. From 2008 to 2015, days at sea by under 10m vessels decreased while days at sea by over 10m vessels increased. Just under a quarter of 15m and over scallop vessels were used for their full allocation of days at sea in Area 7 under the cap in 2012 and 2013, but none used it in later years. The 15m and over vessels that were used for their full allocation of days at sea in Area 7 in 2012 and 2013 were used for more days at sea in Area 4 from 2012 onwards.

Vessels dredging for scallops in Area 7 were mainly operated in areas of the Irish Sea and Western Channel. Days at sea spent dredging around the Isle of Man, in ICES rectangles 36E5 and 37E5, increased significantly from 2008 to 2015.

Total weight of landings (all species combined) by vessels that dredged for Area 7 scallops increased from 2008 to 2012 and decreased afterwards. Under 10m vessels landed a fairly even mix of Area 7 king scallop and other species while over 10m vessels landed mainly Area 7 king scallops, followed by queen scallops.

Catch rates (tonnes landed per day at sea) of Area 7 king scallops declined quite sharply after 2012 for all vessel groups, meaning that catching operations became less efficient year to year.

Average annual first sale prices of Area 7 king scallops ranged between £1,600 and £1,980, increasing in 2014 and 2015, meaning that although technical efficiency fell, profit did not fall by to same extent.

Total annual fishing income (all species, adjusted to 2015 values) for all vessel length groups peaked in 2011 (under 15m) or 2012 (15m and over) and decreased in 2013 and 2014, mainly due to reduced income from Area 7 king scallops. Fishing income (all species) in 2015 increased

slightly compared to 2014 figures as the price of king scallops was higher. Operating costs followed a similar trend to fishing income, with crew and fuel costs reducing after 2012, until a rise in crew costs for 2015.

Profit margins of 15m and over vessels dredging for Area 7 scallops declined during 2012-2014 as fishing income these years decreased more than costs. The fall in income was a result mainly of decreasing landings of Area 7 king scallops, led by steeply falling catch rates, and also decreasing landings of queen scallops. Profit margins of scalloping vessels 15m and over improved in 2015, despite the lower catching efficiency, due in part to higher prices of king scallops but also due to lower fuel prices.

Profit margins of vessels under 15m decreased in 2013 but recovered in 2014 and 2015 helped by an increase in average price of king scallops and an increase in income from king scallops from other areas, as well as the lower fuel prices.

2. INTRODUCTION

As part of the Western Waters Management Regime (WWMR), since 2012 there has been a cap on the annual number of days at sea that 15m and over scallop vessels can operate in ICES Area 7. In 2015 members of the industry raised concerns about declining profitability of these vessels. In response to requests by industry and government (made via the Scallop Industry Consultation Group), Seafish analysed the economic performance of UK vessels that fished king scallops in Area 7, to support decision-making with regards to management measures. This report presents analysis of the activities and economic performance of UK vessels that dredged for Area 7 scallops.

2.1. BACKGROUND AND PURPOSE OF THE ECONOMIC ANALYSIS

Since 2004, the WWMR has applied to vessels fishing for king scallops, queen scallops and crabs in Area 7 (MMO, 2016a). As part of the management regime as implemented in UK there is a limit on the total annual number of days at sea that 15m and over vessels can spend fishing king scallops in Area 7. Initially the limit did not effectively restrict these vessels' activity as their total effort combined was below the limit. But in 2010 the number of vessels dredging for king scallops grew and total effort exceeded the limit. As a result, since 2012 the limits shown in Table 1 applied to 15m and over vessels to prevent the UK exceeding the total effort cap.

Table 1 Annual days at sea limits per vessel (15m and over vessels) under the Western Waters management regime for scallops in Area 7 (source: MMO)

	2012	**2013**	**2014**	**2015**
Days at Sea allocation	166	150	199	221

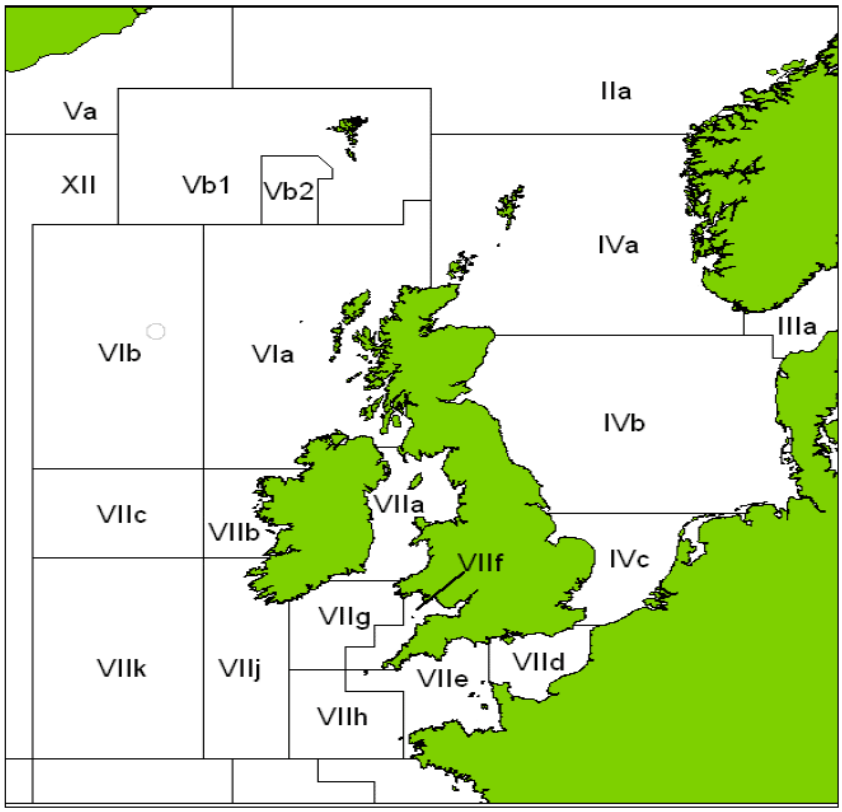

Figure 1 ICES Area 7 and other ICES areas around the UK (Source: ICES)

Following the enforcement of days at sea limits for 15m and over vessels, there were discussions about the profitability of scallop vessels in Area 7 between the Department for Environment, Food and Rural Affairs (DEFRA), the Marine Management Organisation (MMO) and the Scallop Industry Consultation Group (SICG). To inform these discussions, Seafish analysed the economic performance of Area 7 15m and over scallop vessels. The objectives of the analysis were:

- To determine the profits of 15m and over scallop vessels after implementation of the days at sea limits;
- To provide a greater understanding of the factors influencing the profits of scallop vessels active in Area 7; and
- Should the analysis highlight a negative impact on the profits of 15m and over scallop vessels, to help determine its causes and whether intervention is needed.

Seafish published the results of the analysis on the profitability of Area 7 15m and over scallop vessels in March 2016 (Seafish, 2016). Following the conclusion of that analysis, industry and government members of the SICG requested further analysis, this time to include under 15m vessels. This report presents the results of the expanded analysis.

2.2. STRUCTURE OF THE REPORT

The report is structured in the following sections:

- Section 1 provides an executive summary;
- Section 2 provides an introduction to the report;
- Section 3 describes data sources used and methods used in the economic analysis;
- Section 4 provides analysis of fishing activity by vessels dredging for Area 7 king scallops;
- Section 5 provides economic performance indicators of vessels dredging for Area 7 king scallops;
- Section 6 provides the conclusions drawn from the analysis;
- Section 7 provides the references used in the report.

3. DATA SOURCES AND METHODOLOGY

The analysis presented in this report uses fishing activity and economic data of UK vessels that dredged for king scallops in Area 7 to characterise their economic performance in recent years (2008-2015).

The data sources used include:

- Data on **all** vessels that landed any quantity of scallops caught with dredges from Area 7;
- Data on **all** trips undertaken by vessels using dredges and landing any amount of Area 7 king scallops during the period 2008 to 2015, provided by MMO. These data contain information on trip duration, area fished, gear used, composition of landings by species and value landed by species;
- Annual fleet economic performance time series produced by Seafish. These datasets contain information on costs and revenues for every active UK vessel.

A number of assumptions were made in the analysis:

- A day at sea is defined as a calendar day, in line with the definition used for regulatory purposes;
- Trip data do not differentiate steaming and fishing times within the same trip. Therefore, we allocate the overall duration of a trip to fishing effort.

Throughout the report we classify the included vessels in three length groups: under 10m, 10-15m and 15m and over, to analyse and recognise their different characteristics and activity patterns. The analysis also differentiates between king scallops (SCE) and queen scallops (QSC) landings.

The analysis uses the following indicators to describe the activity and economic performance of UK vessels that dredged for king scallops in Area 7:

- Number of vessels;
- Days at sea;
- Areas where fishing activity occurs;
- Catch rates of king scallop (landings per day at sea);
- Annual average price of king scallops;
- Fishing income and costs; and
- Profitability indicators (Gross Value Added margin, operating profit margin).

4. FISHING ACTIVITY OF AREA 7 KING SCALLOP VESSELS

This chapter describes all fishing activity by UK vessels that dredged for king scallops in Area 7, in terms of number of vessels, days at sea and landings.

4.1. GENERAL OVERVIEW

The main gear type used to catch king scallops in UK waters is the dredge. Dredges are towed along the seabed behind a spreading bar, usually one bar from each side of the vessel. The dredges consist of a triangular frame with a toothed bar at the front to lift the scallops out of the seabed and into a collecting bag made of chain links. The length and power of the vessel determine the length of the bar and the number of dredges towed, with vessels under 10m towing around three or four dredges per bar, while larger vessels can tow up to 18 or 20 dredges per bar (Seafish, 2015). Although it is possible to target other species with dredges of various designs, the majority of landings by dredges in the UK are of king scallops (MMO, 2015). Divers catch a much smaller amount of king scallops in the UK (around 5% of total landings).

Figure 2 Scallop dredge, left; and scallop dredging vessel, right (source: Seafish)

There are no catch limits (TACs or quotas) for king scallops in UK waters. UK fisheries administrations manage king scallop fisheries by setting minimum landing sizes, restrictions on numbers of dredges, gear specifications, area closures and effort controls. As a general rule, the number of dredges is limited to 6 to 8 in inshore waters of the UK, with fewer restrictions in outer waters. Several areas around the UK have specific sets of legislation controlling king scallop fisheries in terms of seasonal closures or restricted areas. The main measure creating a limit on dredging effort in Area 7 is the Western Waters Management Regime.

4.2. VESSEL NUMBERS

UK vessels that dredged for king scallops in Area 7 have been classified in three length groups for this analysis:

- Under 10m vessels;
- 10 to 15m vessels;
- 15m and over vessels.

Smaller vessels tend to fish in inshore waters, while larger vessels operate in wider areas and can change fishing areas depending on stock availability and regulation (Howarth & Stewart, 2014).

Therefore, the three groups of vessels have been analysed separately in this report to account for their different characteristics.

4.2.1. VESSEL NUMBERS BY LENGTH GROUP

The total number of vessels that dredged for king scallops in Area 7 ranged between 238 and 320 in 2008-2015. There was a noticeable increase in vessel numbers in 2011, from 238 to 295 vessels.

The number of over 10m vessels grew during the period 2008-2015 from 137 to 195 vessels. The number of 15m and over vessels grew from 77 in 2008 to 104 in 2015; and the number of 10-15m vessels increased from 60 to 91 vessels. The number of under 10m vessels fluctuated between 92 and 133 vessels with no clear trend.

Figure 3 Number of vessels by length group, vessels that dredged for king scallops in Area 7 (source: Seafish, based on MMO data)

4.2.2. VESSEL NUMBERS BY RELIANCE ON KING SCALLOPS

Larger vessels tend to be more highly dependent on king scallops for their total annual fishing income than smaller vessels. Vessels are classified by percentage of annual fishing income (in each year of the analysis) coming from king scallop landings: under 60%, between 60%-80%, between 80%-95% and over 95% of annual fishing income from king scallops.

Most of the under 10m vessels in the analysis are not highly reliant on king scallops for income. These vessels are also used for other fishing activities to target a wide variety of species. Fewer than half of these vessels (between 36%-45% of the total number, depending on the year) rely on king scallop as their main source of income (60% of annual income or more).

King scallops became increasingly important as source of income for 10-15m vessels from 2008 to 2015. In 2008 king scallops were the main source of income for fewer than half (45%) of these vessels. In 2015 nearly three quarters of these vessels (73%) had 60% or more of their annual income from king scallops.

Most 15m and over vessels are highly reliant on king scallops for income. The average revenue dependency rate ranged between 63% and 81% during 2008-2015. The number of 15m and over vessels (active in Area 7) that were highly reliant on king scallop (representing 60% of annual income or more) varied between 54 to 67 vessels from 2008 to 2015.

The number of vessels (active in Area 7) that were fully dependent on king scallop (over 95% of annual income) grew from 31 to 49 between 2011 and 2015. Between 2010 and 2015 the number of 15m and over vessels less dependent on king scallops (less than 60% of annual revenue) grew from 14 to 39, indicating more diverse activities. This could be people whose vessels previously did not catch scallops deciding to add some scallop fishing in Area 7 to their range of fishing activities.

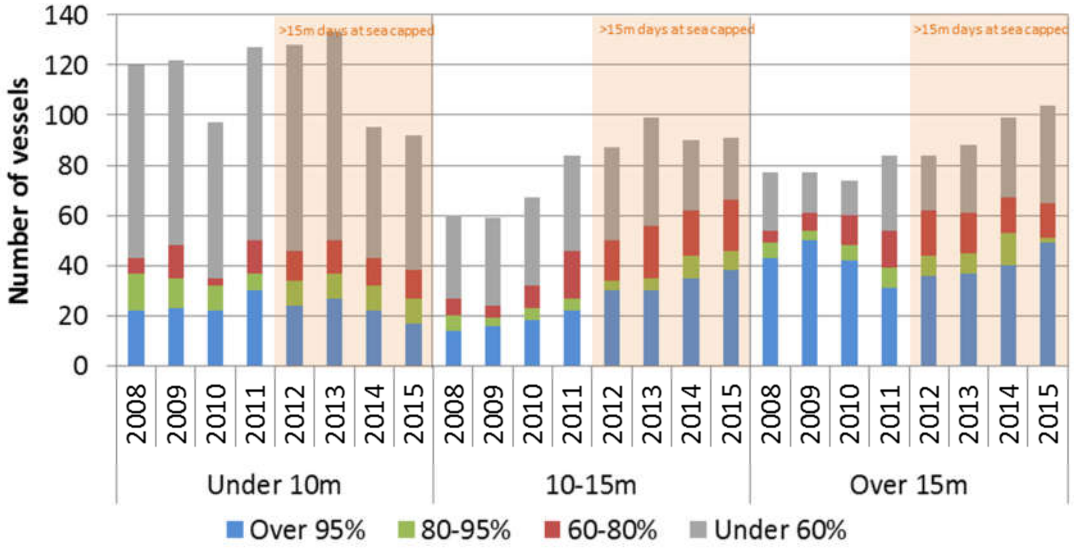

Figure 4 Number of vessels by length group and percentage of annual income from king scallop (source: Seafish based on MMO data)

4.3. DAYS AT SEA

This section describes trends in days at sea fishing with dredges by vessels that dredged for king scallops in Area 7.

4.3.1. DAYS AT SEA BY SEA AREA

Vessels that dredged for king scallops in Area 7 also operated in ICES Areas 4 and 6, but activity in Areas 4 and 6 was significantly less important in terms of total days at sea for these vessels.

Total days at sea (using all gear types) in Area 7 by these vessels grew from 2008 to 2011 and decreased from 2012 to 2015. Days at sea increased from 31,000 in 2008 to just over 34,000 days at sea in 2011, and then decreased to just over 28,000 days at sea in 2015.

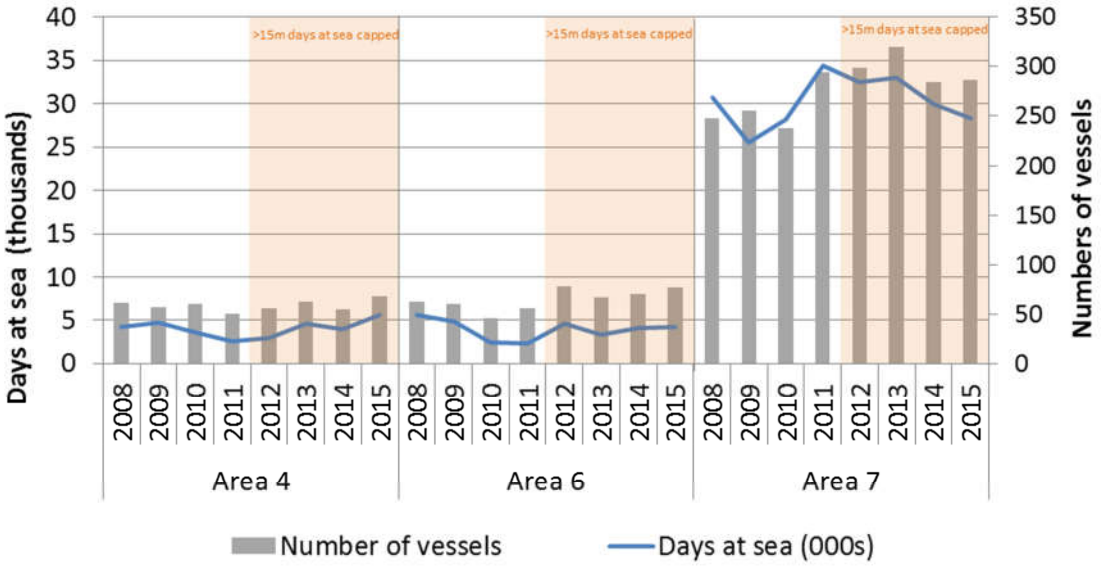

Figure 5 Days at sea (using all gear types) by ICES area: Vessels that dredged for king scallops in Area 7 (source: Seafish, based on MMO data)

4.3.2. DAYS AT SEA BY VESSEL LENGTH GROUP

The contribution of under 10m vessels to total days at sea in Area 7 by scallop vessels became less important between 2008 and 2015. In 2008 under 10m vessels accounted for almost half of days at sea in Area 7 by scallop vessels, with just under 15,000 days at sea. By 2015 they represented less than a quarter of total days at sea in Area 7 by these scallop vessels, with 6,400 days at sea. Figure 3 shows that the number of under 10m vessels that dredged for scallops in Area 7 dropped in 2014 and 2015 from previous years, which led to fewer days at sea in those years.

On the other hand, over 10m vessels that dredged for scallops in Area 7 increased their total days at sea in Area 7 between 2008 and 2015. Total days at sea by 10-15m vessels grew from 7,000 in 2008 to 10,000 in 2015. Total days at sea by 15m and over vessels went from 9,000 to approximately 12,000 in the same period, as a result of increasing vessel numbers.

Figure 6 Total segment days at sea in Area 7 by length group: Vessels that dredged for king scallops in Area 7 (source: Seafish based on MMO data)

Average annual days at sea per under 10m vessel fell from 120 days at sea in 2008 to 70 days at sea in 2015. Average annual days at sea per 10-15m vessel grew between 2008 and 2010 and decreased after 2011. Average annual days at sea for 10-15m vessels were 137 in 2011 and went to 110 in 2015.

Average annual days at sea per 15m and over vessel grew between 2008 and 2011 and decreased after 2012. Average annual days at sea per vessel went from 155 in 2011 to 114 in 2015. The decreasing trend in average annual days at sea by 15m and over vessels from 2012 to 2015 could be caused by the implementation of the days at sea cap in 2012, although the same trend was observed among under 15m vessels which were not affected by the cap.

Figure 7 Average days at sea in Area 7 by length group: Vessels that dredged for king scallops in Area 7 (source: Seafish, based on MMO data)

4.3.3. DAYS AT SEA BY GEAR TYPE

Scallop vessels can use a variety of gears. These gears have been grouped in the following types:

- Dredges: includes boat dredges and mechanized dredges;
- Trawls: includes beam trawls, bottom trawls, nephrops trawls, otter trawls (bottom and midwater), otter twin trawls, pair trawls (bottom and midwater) and shrimp trawls;
- Other gears: includes beach seines, fyke nets, handlines and polelines, pair seines, pots and traps, purse lines, driftnets, encircling gillnets, gillnets and entangling nets, hooks and lines, longlines, set gillnets, Scottish seines, trammel nets, miscellaneous gear and gears not specified.

Under 10m vessels undertook a range of different activities in addition to fishing for scallops. This range shows in the mix of gears they used (dredges, trawls and other gears). Other gears became less important for these vessels with time, going from approximately 7,000 days at sea in 2008 to 1,400 days at sea in 2015. This reduction led to a decrease in total days at sea by under 10m vessels in Area 7, and to dredging and trawling becoming more important for these vessels.

Over 10m vessels in Area 7 used mainly dredges, followed by trawls to a lesser extent; other gears were barely used or not used at all.

Dredging became increasingly important for 10-15m vessels with time. In 2008 these vessels used trawls most of the time (3,600 days at sea) followed by dredges (3,000 days at sea). Trawling days at sea remained at similar levels after 2008 but dredging days at sea increased to approximately 7,200 days at sea in 2015. This increase shows that as well as an increase in numbers of 10-15m scallop vessels in Area 7, there was a shift towards dredging for king scallops as their main activity.

15m and over scallop vessels in Area 7 use dredges most of the time, showing that these vessels are highly specialised in scallop fishing. Dredging days at sea increased from 6,600 days at sea in 2008 to 9,700 days at sea in 2011, then decreased to between 7,900-8,800 days at sea after 2012. This reduction in dredging days at sea from 2012 to 2015 was possibly due to the days at sea cap imposed under the WWMR. 15m and over vessels used trawls for a smaller amount of days at sea, although its use increased after 2010, from 1,600 days at sea in 2010 to 3,000 days at sea in 2015. Trawls are used in the queen scallop fishery in some parts of the UK, in particular around the Isle of Man where the main queen scallop fishery takes place (Murray, 2013).

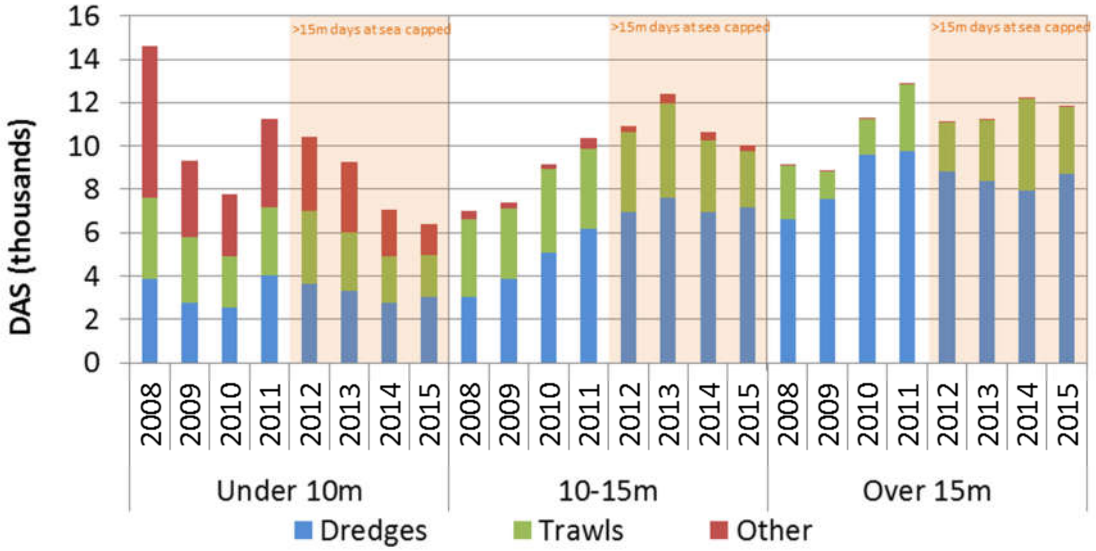

Figure 8 Total segment days at sea in Area 7 by length group and gear type: Vessels that dredged for king scallops in Area 7 (source: Seafish based on MMO data)

4.3.4. EFFECT OF AREA 7 DAYS AT SEA CAP ON 15M AND OVER VESSELS

The number of 15m and over vessels dredging for king scallops in Area 7 each year increased during the period 2008-2015. The highest increase (20 more vessels) took place between 2012 and 2015, after the implementation of the days at sea cap. Therefore, the cap did not appear to have a dissuasive effect on additional 15m and over vessels fishing for king scallops in Area 7.

Total dredging days at sea in Area 7 by 15m and over vessels grew from 2008 to 2011 and stabilised from 2012 to 2015. This trend suggests that, although vessel numbers increased, the days at sea cap established in 2012 may have influenced vessel owners' decisions to spend time fishing in other areas, such as Area 4, which saw an increase in effort over the same time period.

The average number of days per year that a 15m and over vessel spent dredging in Area 7 went down from 2012 to 2015 compared to previous years. Total dredging days at sea in Area 7 by these vessels did not change substantially in those years, but there were more vessels in the area. That meant that on average, each 15m and over vessel had fewer days at sea dredging in Area 7 in order not to exceed the total cap.

Just under a quarter of 15m and over vessels dredging for scallops in Area 7 were used for their full allocation of days at sea under the WWMR in 2012 and 2013, while three quarters did not use their full allowance. In the following years no vessels were used for their full allocation of days at sea. Most 15m and over vessels, between 65% and 97% depending on the year, were used for up to 80% of their days at sea allocation between 2012 and 2015.

Table 2 Number of 15m and over vessels by percentage of allocated days at sea fished under the WWMR

% effort allocation used	2012	2013	2014	2015
Under 20%	14	7	20	28
20%-40%	9	12	30	35
40%-60%	20	32	29	18
60%-80%	12	11	17	14
80%-90%	5	4	1	5
90%-99%	6	3	2	4
Full allocation used	18	19	0	0
TOTAL NUMBER OF VESSELS	84	88	99	104

The 18 vessels that were used for their full allocation of days at sea in Area 7 in 2012 were used for more days in Area 4 from that year onwards. Dredging days at sea in Area 4 by these 18 vessels grew from 700 days in 2012 to 1,100 days in 2015, although the majority of their dredging activity still took place in Area 7. From 2011 these 18 vessels had reducing levels of dredging activity in Area 7, more rapidly declining after the start of the days at sea cap in 2012.

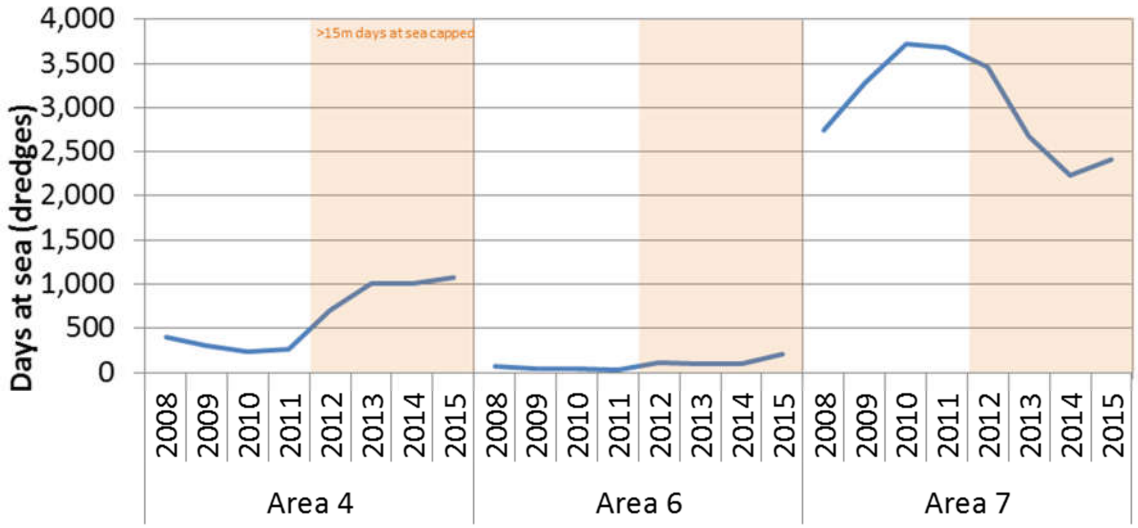

Figure 9 Total dredging days at sea by area by the 18 vessels (15m and over) that were limited by the effort cap in 2012 (source: Seafish based on MMO data)

Since 2012, a higher number than previously of 15m and over vessels were used in Area 7 for other activities in addition to dredging. More 15m and over vessels were used for dredging in Area 4 as well as in Area 7. The reduction in average per vessel dredging days at sea per year in Area 7, discussed above, may explain this diversification, with some vessels being used to target other species or fish in other areas as the days at sea allowance for dredging in Area 7 decreased.

4.4. MAIN FISHING AREAS

Under 10m scallop vessels have dredged mainly in inshore areas of the Western Channel and Irish Sea, while over 10m vessels operate in wider areas around UK. Over 10m vessels were used for a larger proportion of their dredging days at sea in the Western Channel and Irish Sea, but are used to target scallop grounds off the east coasts of England and Scotland too.

Dredging days at sea around the Isle of Man (rectangles 36E5 and 37E5) and the Western Channel (ICES Area 7e) grew significantly from 2008 to 2015. This localised increase in dredging days at sea was largely due to use of over 10m vessels.

In the maps below (Figures 10 to 12), in the minority of cases where a trip straddled more than once rectangle, the total duration of the trip is allocated to each of the ICES rectangles where it took place.

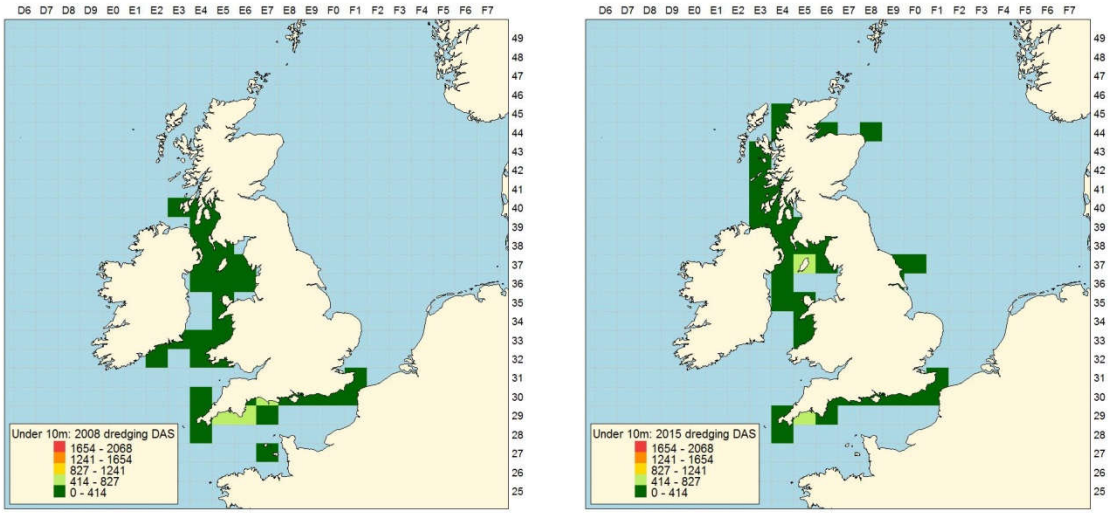

Figure 10 Dredging days at sea by ICES rectangle in 2008 and 2015, under 10m vessels (source: Seafish based on MMO data)

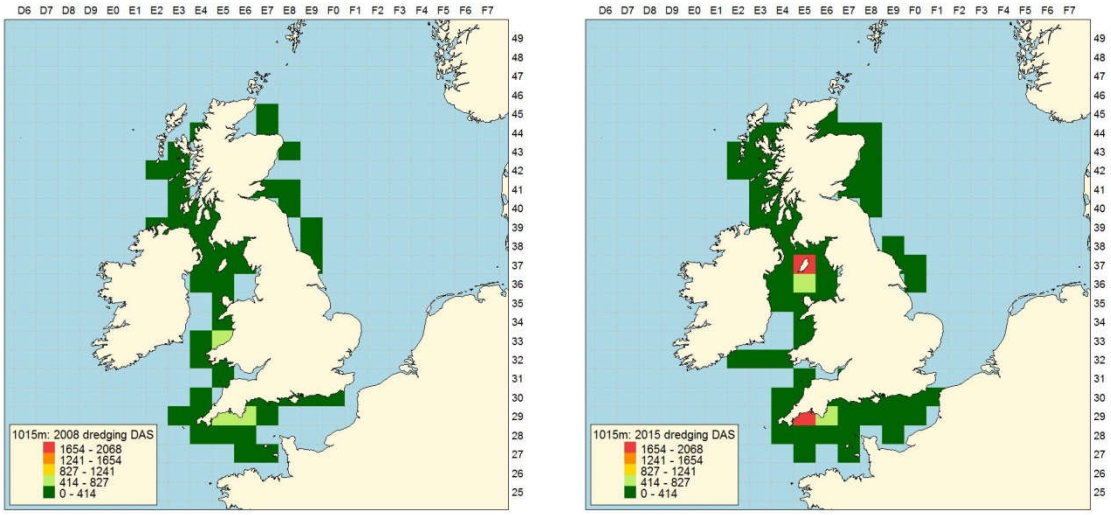

Figure 11 Dredging days at sea by ICES rectangle in 2008 and 2015, 10-15m vessels (source: Seafish based on MMO data)

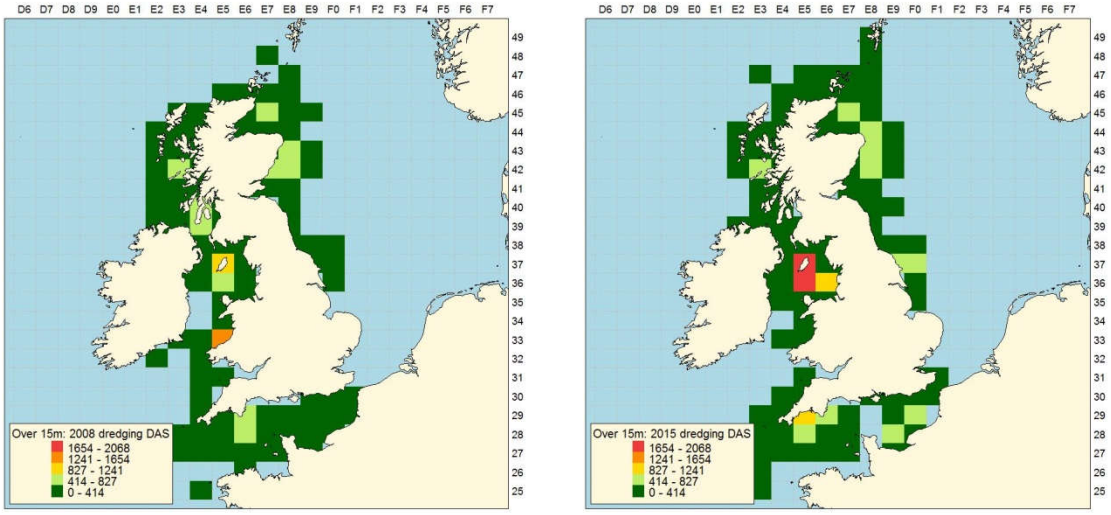

Figure 12 Dredging days at sea by ICES rectangle in 2008 and 2015, 15m and over vessels (source: Seafish based on MMO data)

Dredging days at sea in rectangles 36E5 and 37E5 (around Isle of Man) increased significantly from 2008 to 2015. All three vessel length groups spent more days dredging in this area, but the increase was more evident for 10-15m vessels. Dredging days at sea by 15m and over vessels also increased from 2008 to 2012, and remained largely stable around 2012 levels after that year.

Total dredging days at sea in the Western Channel were largely stable from 2008 to 2015, but over 10m vessels represented a larger share of those each year. In 2008, dredging days at sea in this area were evenly distributed among the three vessel groups. By 2015 days at sea by under 10m vessels had decreased by 64%, while days at sea by 10-15m vessels increased by 60%

compared to 2008. In 2015 10-15m vessels were responsible for approximately half the total dredging days at sea in the area.

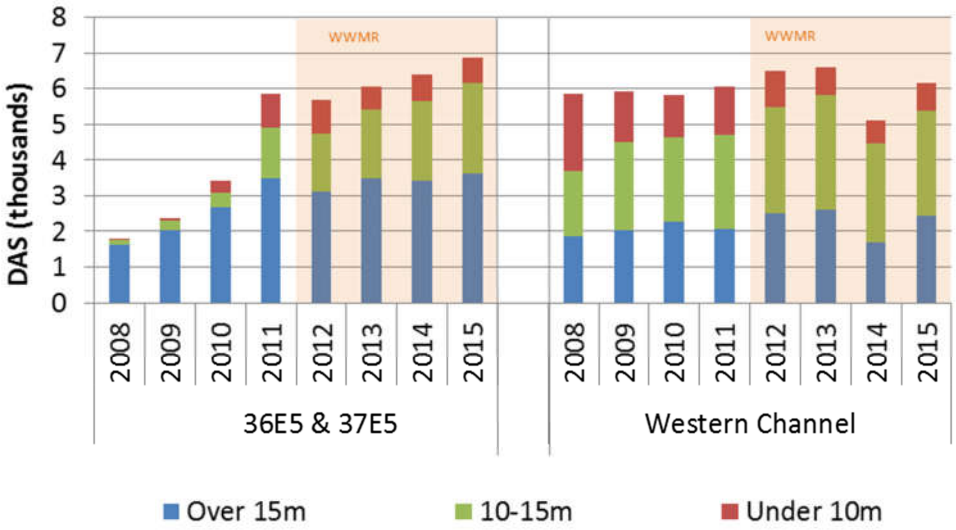

Figure 13 Dredging days at sea in ICES rectangles 36E5 and 37E5 (around Isle of Man) and Area 7e (source: Seafish based on MMO data)

4.5. WEIGHT OF LANDINGS

4.5.1. WEIGHT OF LANDINGS BY SPECIES TYPE

Total weight of landings (all species) by vessels dredging for Area 7 scallop increased from 2008 to 2012 and decreased afterwards.

Landings by under 10m vessels consisted of an approximately even mix of Area 7 king scallops and other species. The total weight landed by these vessels decreased from 5,000 tonnes in 2012 to 3,000 tonnes in 2015, led by a decline in days at sea by these vessels in that period.

Landings by 10-15m vessels grew from 9,000 tonnes in 2008 to 16,000 tonnes in 2013 and fell to 10,000 tonnes in 2015. From 2008 to 2015 the composition of landings by 10-15m vessels changed and king scallops became the main species in the mix. In 2008 these vessels landed mostly other species (70% of weight landed) and a smaller amount of king scallops, but in 2015 king scallops represented 60% of the weight landed.

Landings by 15m and over vessels grew from 23,000 tonnes in 2008 to 41,000 tonnes in 2012 and fell in 2015 to 31,000 tonnes. King and queen scallops dominated landings by these vessels. Landings of Area 7 king scallops grew from 10,000 tonnes in 2008 to 17,000 tonnes in 2010, and after 2011 declined each year to 9,000 tonnes in 2015. Conversely, as landings of Area 7 king scallops declined, landings of Areas 4 and 6 king scallops grew, from 3,000 tonnes in 2011 to 7,000 tonnes in 2015. In 2011 and 2012 landings of queen scallop almost doubled in weight compared to previous years, causing a sharp increase in total weight landed those years. After 2011 some 15m and over vessels were used for other activities and were used in areas other than Area 7 to dredge.

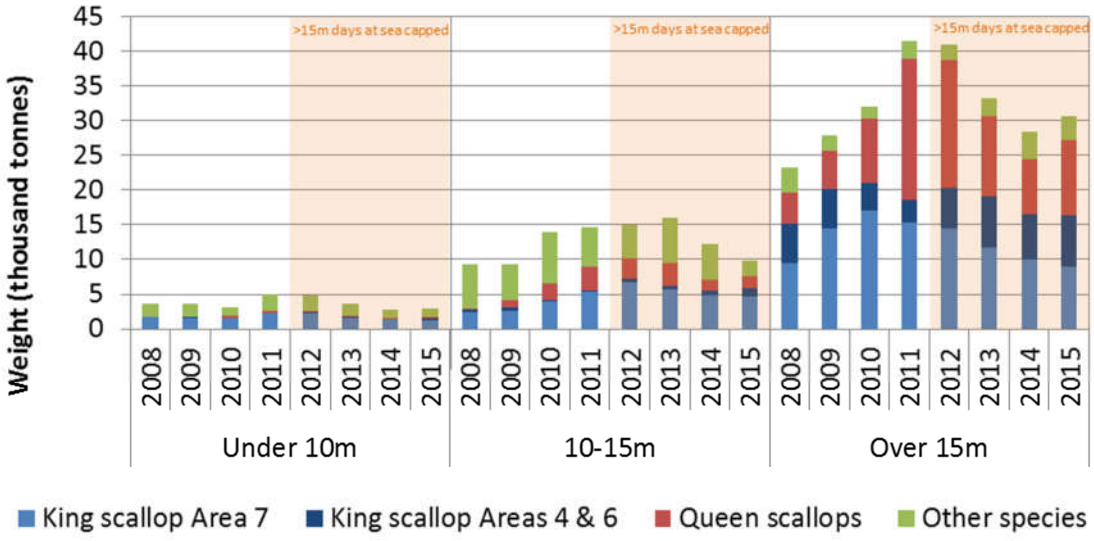

Figure 14 Weight of annual landings by length group and species type – Vessels dredging for Area 7 king scallops (source: Seafish based on MMO data)

4.5.2. WEIGHT OF LANDINGS BY MONTH AND SPECIES TYPE

Analysis of landings by month shows that dredging for king scallops is a seasonal activity occurring mainly from autumn to spring. In the summer months vessels are used to target other species or, in more recent years, queen scallops. This seasonal pattern matches the closures implemented in the Irish Sea, Welsh waters or the Devon coast, where king scallop fishing is open typically between November and April or May[1].

Data on monthly landings from under 10m vessels shows that for these vessels, after scallops and whelks, nephrops was the third most important species in 2008 but in 2015 the third most important species was queen scallops.

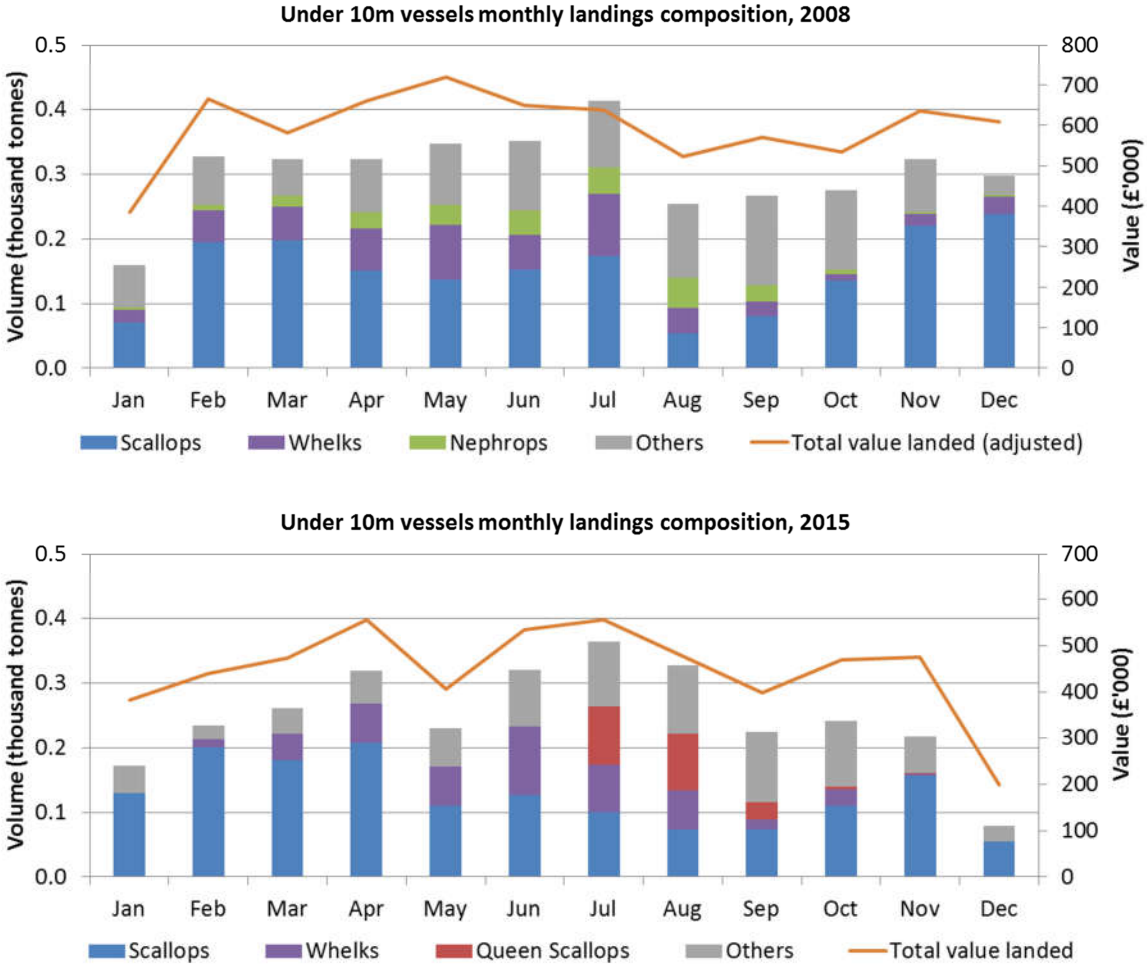

Figure 15 Monthly weight and value of landings in 2008 and 2015, under 10m vessels that dredged for scallops in Area 7 (source: Seafish based on MMO data)

[1] https://secure.toolkitfiles.co.uk/clients/15340/sitedata/byep/Devon-and-Severn-IFCA-Technical-1.pdf

Analysis of monthly landings from 10-15m vessels confirms that operators of these vessels changed from targeting mixed species in 2008 to mostly dredging for king scallops and queen scallops in 2015. In 2008 10-15m vessels targeted king scallops, mussels or sprats depending on the season. By 2015 these vessels had specialised in king scallop from autumn to spring and queen scallop in the summer in a similar way to 15m and over vessels.

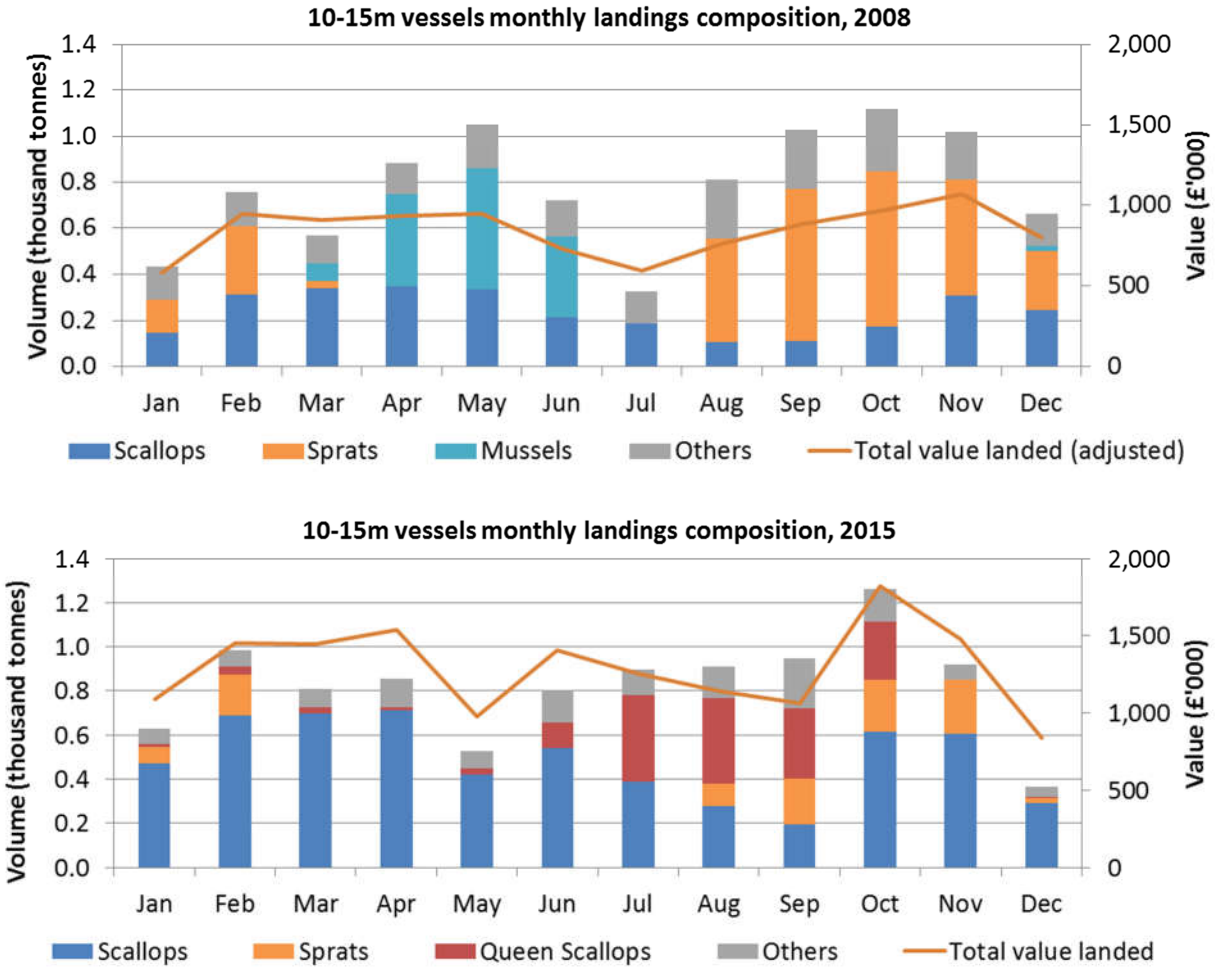

Figure 16 Monthly weight and value of landings in 2008 and 2015, 10-15m vessels that dredged for scallops in Area 7 (source: Seafish based on MMO data)

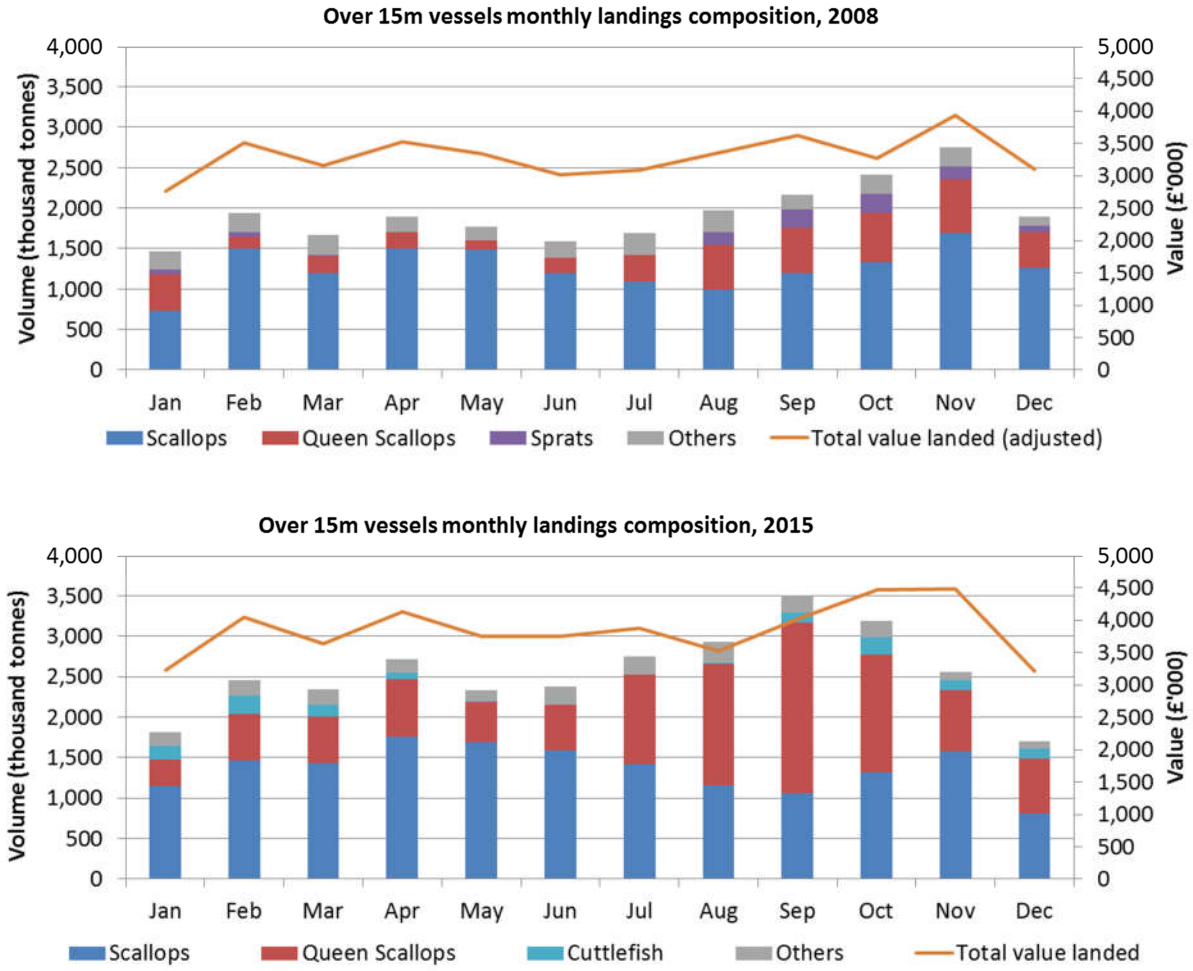

Figure 17 Monthly weight and value of landings in 2008 and 2015, 15m and over vessels that dredged for scallops in Area 7 (source: Seafish based on MMO data)

4.5.3. WEIGHT OF LANDINGS OF AREA 7 KING SCALLOPS BY VESSEL GROUP

Of the total amount of Area 7 king scallops landed by vessels dredging in Area 7, more than half was landed by 15m and over vessels in each year during the period 2008 to 2015. The share of total landings of Area 7 king scallops by these 15m and over vessels decreased from 77% in 2009 to 62% in 2015. Conversely, the share landed by 10-15m vessels increased from 17% to 30% in the same period. These trends were a result of decreasing landings of Area 7 king scallops by 15m and over vessels.

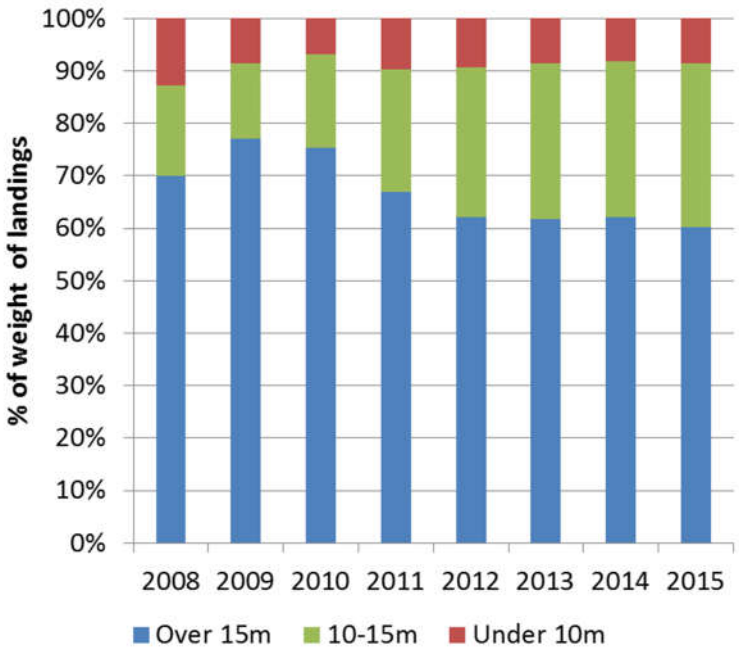

Figure 18 Percentage of weight of landings of Area 7 king scallops by vessel length group (source: Seafish based on MMO data)

5. ECONOMIC PERFORMANCE OF AREA 7 KING SCALLOP VESSELS

5.1. MAIN FACTORS AFFECTING INCOME AND PROFITABILITY

For fishing businesses, the main factors that influence profits are sales prices of scallops landed, catch rates (weight of landings per day at sea), which together create total fishing income, and the costs of fishing (fuel and labour being usually the biggest).

5.1.1. PRICES OF KING SCALLOPS

The average annual price of Area 7 king scallops ranged between £1,600 and £1,980 per tonne in the period 2008-2015 (prices adjusted to 2015 prices). Prices increased in 2014 and in 2015.

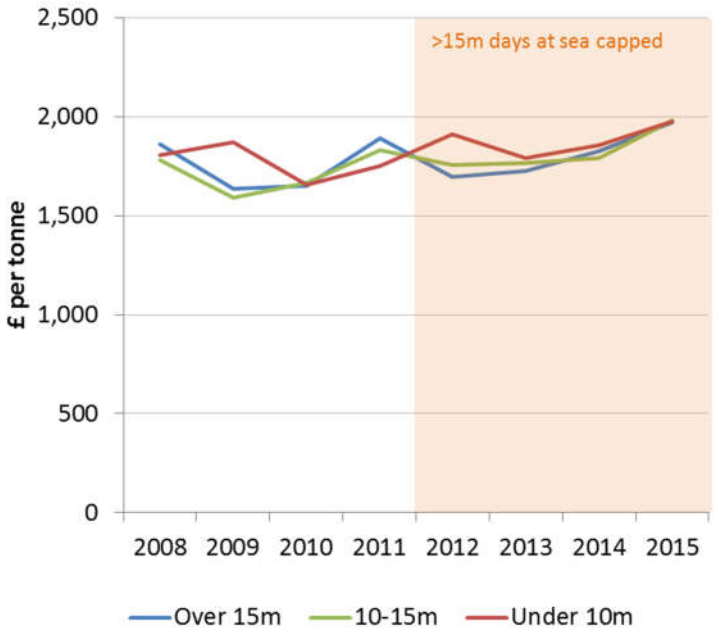

Figure 19 Average king scallop prices, Area 7 king scallops, by length group of vessels (source: Seafish based on MMO data) (adjusted to 2015 prices)

5.1.2. LANDINGS OF KING SCALLOP PER DAY AT SEA

Catch rates, expressed as weight of landings per day at sea, indicate the efficiency of scallop catching. The king scallops catch rates analysed in this section are from trips where Area 7 king scallops represented at least 90% of the total value landed, to focus the analysis on this species.

Catch rates of Area 7 king scallops by all sizes of vessels have decreased since 2012, meaning that all vessels were becoming less efficient and were generating less to sell per day at sea. Catch rates for under 10m vessels were highest in 2010 at average per vessel of just over 700kg per day at sea, and declined afterwards to average per vessel of 450kg per day at sea in 2015. Catch rates of Area 7 king scallops by 10-15m vessels grew to an average per vessel of 1,000kg per day at sea in 2012 and decreased afterwards to an average per vessel of just below 700kg per day at sea in 2015. Catch rates of Area 7 king scallops by 15m and over vessels were highest in 2009 and 2012 at an average per vessel of 2,000kg per day at sea and decreased by 2015 to an average per vessel of 1,300kg per day at sea (a 35% decrease).

The individual trends in catch rates for the different length groups of vessels may be linked to operating on separate fishing grounds. However, trip level data only provide location information at the ICES rectangle level; therefore it is not possible to refine the spatial analysis any further.

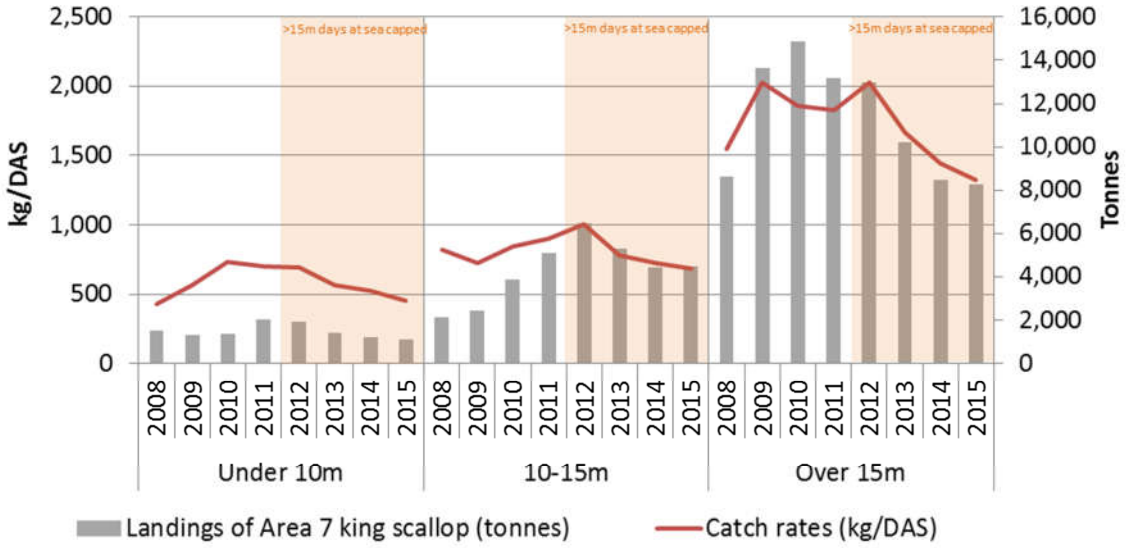

Figure 20 Catch rates of Area 7 king scallops by vessel length group (source: Seafish based on MMO data)

5.2. COSTS AND EARNINGS ANALYSIS

This section presents costs and earnings analysis for the three length groups of vessels that landed king scallops in Area 7: under 10m, 10-15m and 15m and over vessels. Data on fishing costs for each group of vessels were extracted from the Seafish multiannual fleet economic time series, which contains data on costs and earnings for every vessel in the UK. Average per vessel figures are shown in Figure 21 and total segment figures are shown in Figure 22.

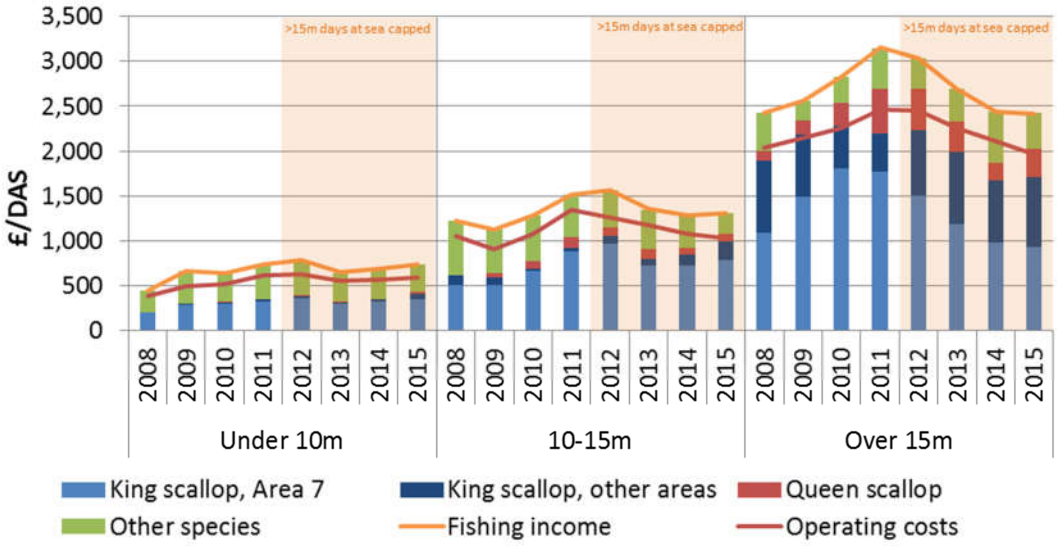

Figure 21 Average costs and fishing income (all species) per day at sea by vessels that dredged for Area 7 king scallops. Values adjusted to 2015 equivalent. (source: Seafish based on MMO data)

Under 10m vessels that dredged for scallops in Area 7

Average fishing income (from all species landed) per day at sea of the under 10m vessels increased from £450 in 2008 to £780 in 2012, decreasing later to £685 in 2014 (values adjusted to 2015 equivalent value). In 2015 average income increased to £735 (see Figure 21). Fishing income of these vessels was evenly split between Area 7 king scallops and other species. Average daily income (averaged across the year) from Area 7 king scallops rose from £196 in 2008 to £360 in 2012. From 2013 to 2015 income from king scallops decreased to an average of £320 per day at sea. This decrease was a result of lower landed weight of king scallops. But the fall in income was not as severe as the fall in landed weight as the price of king scallops increased in 2014 and 2015.

Total segment fishing income of under 10m vessels was highest in 2011 and 2012 at £9m and decreased from 2013 to 2015 to £5m (see Figure 22). The highest fishing income in 2011 and 2012 corresponds to the years when vessel numbers, days at sea and weight of landings (Area 7 king scallops and other species) increased. In following years numbers of vessels, days at sea, king scallop catch rates and weight of landings decreased, driving down fishing income.

Average costs per day at sea of under 10m vessels grew from £385 in 2008 to £630 in 2012 and decreased afterwards to £585 in 2015.

Total fishing costs of under 10m vessels followed the same trend as fishing income, peaking in 2011 and 2012 and falling from 2013 to 2015. The decrease in costs since 2013 was due to decreasing fishing costs (fuel, crew and other fishing costs). Crew costs in the UK are normally linked to fishing income, so a decrease in fishing income would normally be expected to result in lower crew wages, which has implications for crew retention.

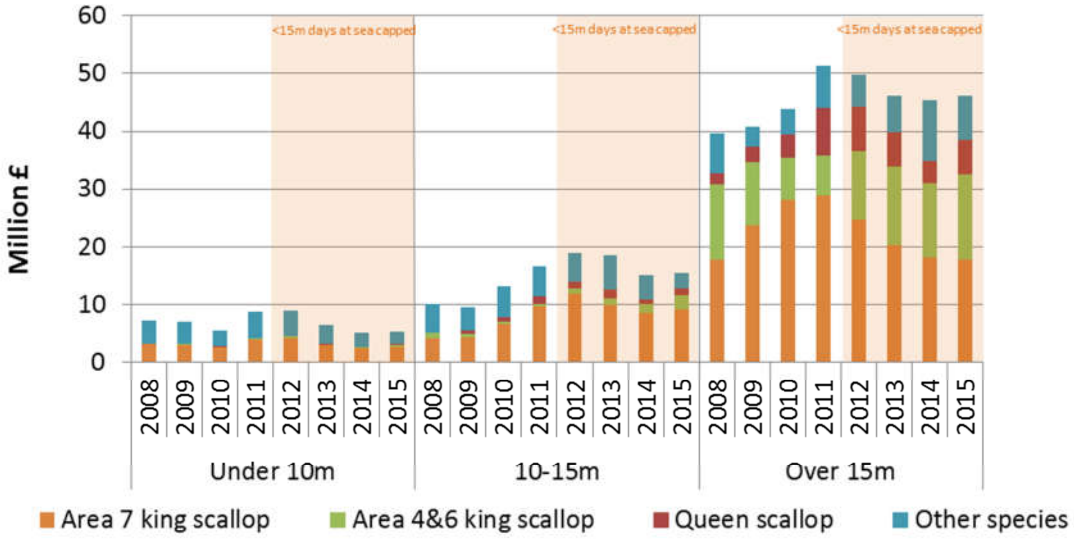

Figure 22 Total segment fishing income by species: vessels dredging for Area 7 king scallops (source: Seafish based on MMO data)

10-15m vessels that dredged for scallops in Area 7

Average fishing income (from all species landed) per day at sea of the 10-15m vessels grew from £1,220 in 2008 to £1,560 in 2012, decreasing later to £1,300 in 2015 (values adjusted to 2015 equivalent value). The main sources of fishing income of these vessels were Area 7 king scallops and "other species". Between 2008 and 2015 there was a shift towards Area 7 king scallops becoming increasingly important as a source of income, from representing 40% of income in 2008

increasing to 60% in 2015. Income from Area 7 king scallops per day at sea (averaged across the year) went from £500 in 2008 to £970 in 2012, and fell to £780 in 2015 due to decreasing weight of landings, despite higher prices for scallops.

Total segment fishing income of 10-15m vessels duplicated between 2008 and 2013 from £10m to £19m and decreased afterwards to £15m in 2015. The growth in fishing income up to 2013 was a result of increased numbers of vessels, days at sea and weight of landings, particularly of Area 7 king scallops. Conversely, fishing income fell in 2014 and 2015 as numbers of vessels, days at sea, and weight of landings of Area 7 king scallops and other species declined.

Average costs per day at sea of 10-15m vessels grew from £1,050 in 2008 to £1,340 in 2011 and then decreased each year to £1,030 in 2015.

Total segment fishing costs of 10-15m vessels followed the same trend as fishing income, growing until 2013 to £16m and falling in 2014 and 2015 to £12m. The reduced fishing costs in 2014 and 2015 were a result mainly of falling fuel costs, with crew costs also falling but to a lesser extent.

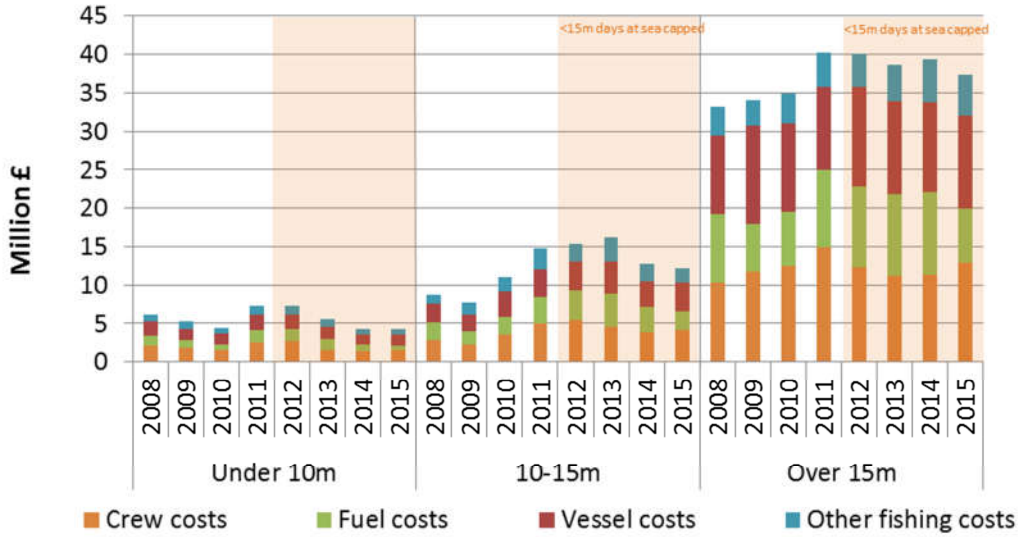

Figure 23 Total segment operating costs and structure: vessels dredging for Area 7 king scallops (source: Seafish based on MMO data)

15m and over vessels that dredged for scallops in Area 7

Average fishing income (from all species landed) per day at sea of the 15m and over vessels grew from £2,400 in 2008 to £3,150 in 2011 and decreased afterwards to £2,400 in 2015 (values adjusted to 2015 equivalent value). The reduction in fishing income after 2011 was mostly due to declining income from Area 7 king scallops and queen scallops. This loss of income was not totally compensated by income from other areas or species, although income from king scallops from other areas became more important in those years.

Total segment fishing income of 15m and over vessels grew from £40m in 2008 to £52m in 2011, and decreased afterwards to £46m in 2015. The growth in fishing income up to 2011 was a result of increasing days at sea and weight of landings. Conversely, fishing income fell from 2012 to 2015 as days at sea, king scallop catch rates and therefore weight of landings declined. In 2011 the catch rate of Area 7 king scallops dropped for this group of vessels, and from 2013 onwards the annual catch rate fell sharply.

Average costs per day at sea for 15m and over vessels grew from £2,035 in 2008 to £2,460 in 2011 and then decreased each year to £1,960 in 2015.

Total segment fishing costs of 15m and over vessels increased from £33 million in 2008 to £40 million in 2012 and remained largely stable after that year at around £38m. The growth in fishing costs up to 2012 came from growing days at sea (and associated crew and fuel costs), which after 2012 stabilised at around 12,000 days at sea.

5.3. ECONOMIC PERFORMANCE INDICATORS

Operating profit margin is operating profit as a percentage of total income (fishing and non-fishing income) and Gross Value Added (GVA) margin is defined as GVA as a percentage of total income. These measures are presented for the three vessel length segments in Figure 24.

Annual segment profit margins of under 10m vessels varied between 17% and 27% of total income in 2008-2015. In 2014 and 2015, profit margins increased due to the higher price of king scallops and lower fuel prices.

Annual segment profit margins of 10-15m vessels varied between 12% and 23% of total income in 2008-2015. In 2014 and 2015 profit margins increased due to a higher price of king scallops.

Operating profit margins of 15m and over vessels were highest at 23% of total income in 2010 and 2011 and decreased down to 15% of total income in 2014. Between 2012 and 2014 fishing income fell by 9% but fishing costs fell by only 2%, which resulted in lower profit margins. 2015 profit margins increased to 20% of total income due the higher price of king scallops. GVA margins largely followed operating profit margins for all vessel length groups.

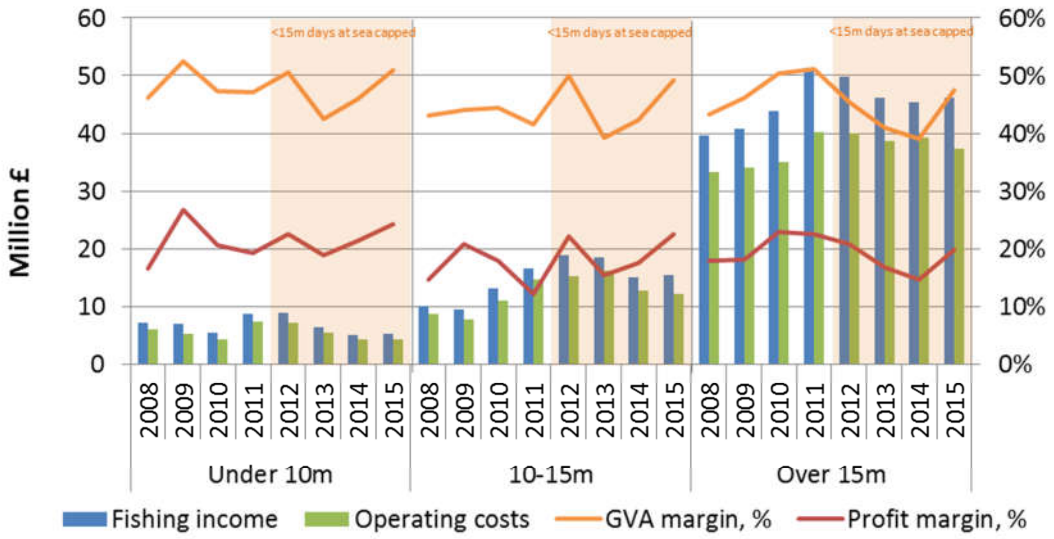

Figure 24 Economic performance indicators by vessel length segment: vessels dredging for Area 7 king scallops (source: Seafish based on MMO data)

6. CONCLUSIONS

Vessels that dredged for Area 7 king scallops are considered in three length groups with different characteristics and patterns of activity: under 10m vessels, 10-15m vessels and 15m and over vessels. Under 10m vessels are less specialised in scallop dredging, being used to target also a variety of other species with a mix of gears. 10-15m vessels were used to target a variety of other species apart from king scallops in 2008, but became increasingly specialised in king scallops as years passed. 15m and over vessels were highly specialised in dredging for king scallops dredging with queen scallops a secondary source of income.

Since 2012, 15m and over vessels have been subject to an annual days at sea cap in Area 7 under the Western Waters Management Regime (WWMR). Industry and government requested Seafish to evaluate the profitability of these vessels during the period under the effort cap.

Profit margins of 15m and over vessels in Area 7 declined during 2012 to 2014, when fishing income fell by more than fishing costs. The fall in annual fishing income was mainly due to a reduction in income from Area 7 king scallops. Although income from king scallop from other areas grew in 2012-2014, it was not enough to compensate the loss of income from Area 7.

Fishing income from Area 7 king scallops for 15m and over vessels decreased in 2012-2014 due to falling weight of landings. Total landings of Area 7 king scallops by these vessels went from 15,000 tonnes in 2012 to 10,000 tonnes in 2014 although the number of vessels targeting king scallops increased.

The fall in Area 7 king scallop landings by 15m and over vessels was a result of falling catch rates, which dropped by 35% from 2012 to 2015. Dredging days at sea decreased in that period by 10%, but the weight of landings fell more severely (by 30%), as a result of lower catch rates.

Therefore the main influence behind the decline in profit margins of Area 7 15m and over vessels from 2012 to 2014 was a fall in king scallop catch rates. The days at sea cap imposed under the WWMR reduced dredging days at sea by these vessels after 2012, but the decline in weight of king scallop landings was more severe that the fall in dredging activity. Landings of Area 7 king scallops by these vessels began to fall in 2011, when the days at sea cap was not yet enforced and dredging activity had not yet started to decrease.

In 2015 the average annual profit margin of 15m and over vessels dredging for Area 7 scallops improved as prices of king scallop increased.

The fall in Area 7 king scallop catch rates after 2012 also affected under 15m vessels, resulting in reduced weight of landings after that year. Profit margins of these vessels decreased in 2013. For 10-15m vessels fishing income in 2013 remained at 2012 levels due to increasing income from other species, but fishing costs grew resulting in a dip in profit margins. Fishing income of under 10m vessels in 2013 decreased more than costs, driving down profit margins. Their profit margins recovered in 2014-2015 helped by an increase in average price of king scallops and an increase in income from king scallop from other areas.

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