SEAFISH

SEAFISH ECONOMIC ANALYSIS

UK king scallop dredging sector 2008 – 2016
2nd Edition, final 2016 data

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Contents

1. Executive summary

Most UK king scallops are landed by revenue-dependent vessels.
UK vessels earning over 60% of annual fishing income from king scallops (designated as "revenue-dependent vessels") in any given year landed a large majority (between 85% and 91%) of total annual UK king scallop landings each year from 2008 to 2016.

Total scallop fishing effort increased steadily from 2008 to 2016.
Total annual effort by scallop revenue-dependent vessels (excluding low activity vessels) increased by 53%, from around 18,500 dredging days at sea in 2008, to over 28,000 dredging days at sea in 2016. The number of UK scallop revenue-dependent vessels, excluding low activity vessels, increased from 135 in 2008 to 203 in 2016.

There was a large increase in the number of 10m-15m scallop revenue-dependent vessels, more than doubling from 39 vessels in 2008 to 89 in 2016. Vessels 20m and over landed around half of the UK's total king scallops from 2008 to 2016, with 27 vessels per year, on average.

Total landings of scallops increased to 2012 then decreased.
Landings of king scallops by revenue-dependent vessels increased from around 19,000 tonnes in 2008 up to nearly 30,000 tonnes in 2012. Landings then decreased to around 24,000 tonnes in 2016. Since 2012, the total amount of UK landings of king scallops by revenue-dependent vessels has decreased despite increasing fishing effort.

Productivity, measured by catch rates, has declined since 2012.
Catch rates for scallops by revenue-dependent vessels increased from 2008 to 2012 and then declined to 2016. Landings per day at sea, landings per kW day at sea, and landings per dredge per day at sea all increased from 2008 to 2012 and then declined sharply to 2016.

Sea areas showing high productivity in 2012 (English Channel and Irish Sea) were considerably less productive in 2016. North Sea and West of Scotland productivity rates have remained relatively stable but have shown a rapid increase in effort in recent years.

Vessels of 10m-15m length experienced the largest decline in landing productivity.

Vessel profits declined from a 2012 peak until 2014 and have increased in 2016.
After a decline to 2013, vessel profits benefited from higher scallop prices and lower fuel prices in the last few years. King scallop prices increased from £2.01 in 2008 to £2.34 in 2016 (adjusted for inflation). The average UK fuel price to the fleet fell from £0.55 per litre in 2013 (adjusted for inflation) to £0.34 per litre in 2016.

The sum of the total operating profit of revenue-dependent vessels increased from £7.8 million in 2008 to £13.8 million in 2015 (adjusted for inflation). In 2012, operating profit reached £13.3 million but in 2013 (due to a large decrease in landings) total operating profit dropped to £8.6 million.

2. Introduction

2.1 Background and purpose of the report

In 2015 the Scallop Industry Consultation Group (SICG) raised concerns over declining profits in ICES area 7 (including the English Channel and Irish Sea). In response to these concerns Seafish was asked to conduct an economic analysis of king scallop dredge vessels operating in area 7. The first Seafish report (published March 2016) focused on over 15m vessels in order to investigate whether the Western Waters regime (WWR) effort limits impacted profits. A second Seafish report (published November 2016) included all vessels targeting king scallops in area 7. The evidence presented in these two reports showed a decline in profits for king scallop fishing in area 7, for vessels limited by the WWR and those unaffected by the WWR, due to reducing catch efficiency rather than to the effort limitation scheme.

The SICG then requested a detailed analysis of industry performance throughout the UK in order to ensure that policy discussions are informed by an understanding of the whole annual activity of UK vessels fishing for king scallops. A first edition of this report was published in May 2017, using provisional data for 2016. This 2nd Edition of the UK report is based on final 2016 data, and illustrates the economic and operational performance of UK vessels dependent on king scallops since 2008. One of the key differences is that effort data are now confirmed and the apparent fall in dredging effort in 2016 shown based on provisional data is now corrected to show an increase in total dredging days at sea in this 2nd Edition of the report.

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 the data sources and methods of analysis used in the report;
- Section 4 provides an overview of sector characteristics
- Section 5 presents an analysis of fishing effort;
- Section 6 presents an analysis of King Scallop landings;
- Section 7 provides an analysis of operational productivity;
- Section 8 provides an analysis of different length categories;
- Section 9 provides an analysis of economic productivity;
- Section 10 provides a conclusion to the report.

3. Data sources and methodology

Analyses in this report use fishing activity and economic data of all UK vessels that landed king scallops (*Pecten maximus* Linnaeus) in recent years (2008-2016). This 2nd Edition of the report uses final 2016 data, as opposed to the provisional data used in the first edition.

Data sources used include:

- Data on **all** vessels that landed any quantity of king scallops by UK, Jersey, Guernsey and Isle of Man vessels;
- Data on **all** trips undertaken by vessels landing any quantity of king scallops using dredges during the period 2008-2016, provided by the Marine Management Organisation (MMO). These data contain information on trip duration, area fished, gear used, composition of landings by species and value landed by species;
- In most graphs (noted in each case) we have excluded data on vessels that are classed as **low activity vessels** in the annual data. **Low activity vessels** are those which had annual fishing revenues (from all species) below £10,000.
- The volume and value of landings by low activity vessels is very low in each year and most of the vessels classed as low activity were under 10m in length
- Annual fleet economic performance time series produced by Seafish. These datasets contain information on costs and revenues for every active UK vessel.

Assumptions made in this analysis:

- A Day at Sea (DAS) is defined as a calendar day, as used for regulatory purposes;
- Trip data do not differentiate steaming and fishing times in each trip. Therefore, we allocate the overall duration of a trip to fishing effort. This is consistent with the approach followed in setting and monitoring uptake against the baseline effort applicable under the WWR.

Vessel length groups:

In this report, figures are presented for vessels in different length groups: under 10m, 10m-15m, 15m-20m, and 20m and over. Vessels of 15m length are included in the 15m-20m length group and vessels of 20m are included in the 20m and over length group. This allows for the different characteristics of vessels in different length groups to be analysed and recognised in relation to their activity and performance.

Revenue-dependent vessels:

Vessels that earned 61% or more of their annual fishing income from king scallops in any year are classified in this report as “revenue-dependent” vessels in that year. An individual vessel may be classed as revenue-dependent in some years but not in others. The main analysis in this report covers only vessels that were revenue-dependent in each of the reference years. Revenue-dependent vessels were together responsible for landing between 85% and 91% of total annual king scallops landings by UK vessels in the years from 2008 to 2016.

Figure 3.1 and Figure 3.2 show the proportion of total landings and total dredging effort by vessels of different degrees of revenue dependence on king scallops. Revenue dependence is calculated for vessels by taking income for the year from king scallops as a percentage of total fishing income (all species).

Adjustments for inflation:

Monetary values for scallop prices, fuel prices and profits are adjusted to 2016 values to remove the effect of inflation on annual changes.

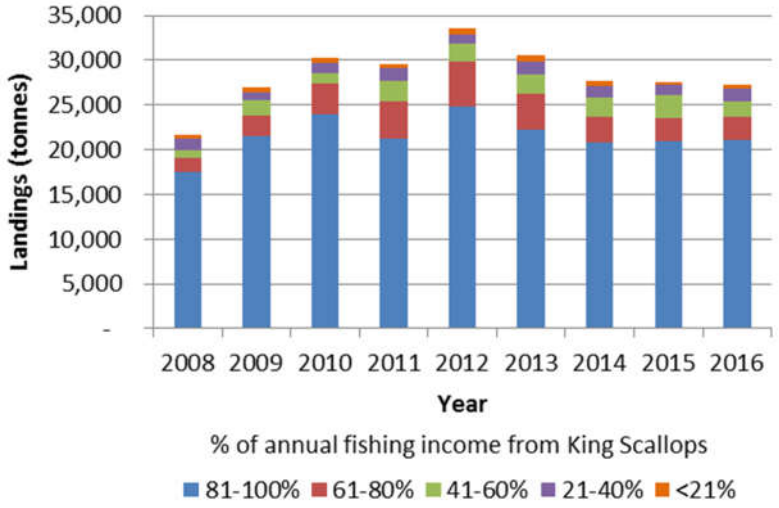

Figure 3.1 Total annual landings (tonnes) of king scallops by UK vessels according to the proportion of vessels' annual fishing income from king scallops. Source: Seafish, based on MMO data.

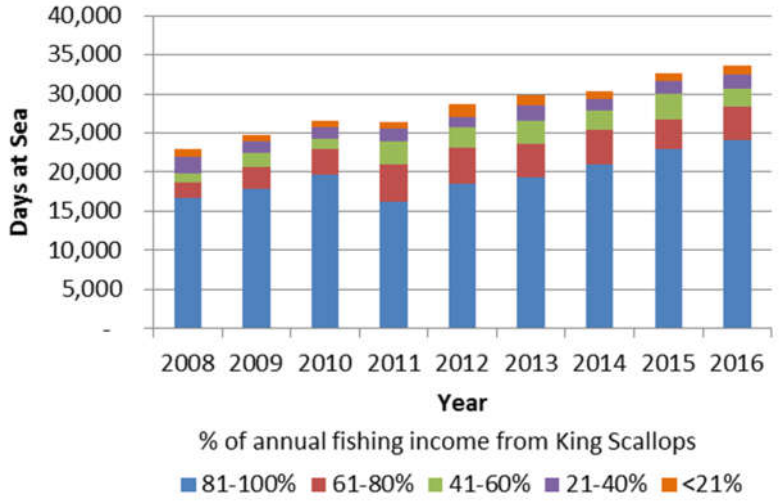

Figure 3.2 Total dredging days at sea by UK vessels according to the proportion of vessels' annual fishing income from king scallops, not including low activity vessels. Source: Seafish, based on MMO data.

Analyses in this report use the following indicators to describe the activity and economic performance of UK vessels that landed king scallops:

- Number of vessels
- Days at Sea (DAS)
- Hours at Sea (HAS)
- Areas where fishing activity occurs
- Landing rates for king scallops
- Annual average price of king scallops
- Annual average fuel price

4. General sector overview

This chapter introduces the king scallop sector, in terms of fishing methods, fleet management, number of vessels, number of revenue-dependent vessels, effort, landings and temporal and spatial extents of activity.

4.1 Introduction to king scallop fishing

The main gear type used to catch king scallops by UK vessels is the Newhaven dredge. These dredges are towed along the seabed behind a spread bar, usually one bar from each side of the vessel. The dredge consists 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. Smaller vessels under 10m in length typically tow 3-4 dredges per bar, while larger vessels (over 20m in length) can tow up to 20 dredges per bar (Seafish, 2015). Although dredges do catch unintended species of various types, the majority of landings by vessels using dredges in the UK are king scallops[1]. King scallops can also be targeted by mechanical dredge and can be dive caught, though these make up less than 5% of total landings. Dive caught scallop landings have been excluded from this report. Scallops are caught as by-catch by trawls being used to catch other species, but these catches have been less than 4% of total king scallop landings in every year since 2008.

There are no catch limits (TACs or quotas) for king scallops in UK waters. UK fisheries administrations manage king scallop fishing by setting minimum landing sizes, restrictions on number of dredges, gear specifications, area closures and effort controls. As a general rule, the number of dredges is limited to 6-8 in inshore waters around the UK, with fewer restrictions in outer waters. Several areas around the UK have specific legislation controlling king scallop dredging by seasonal closures or restricted areas, the most notable seasonal closure occurring in the Irish Sea. The main effort limitation in UK waters is the limit of days at sea in Area 7 through the Western Waters Regime (WWR), which sets an annual allocation and applies to vessels 15m and over fishing for scallops.

4.2 Vessel numbers

4.2.1 Vessels numbers by revenue dependence

The number of UK vessels that caught king scallops of any quantity (not including low activity vessels) was fairly steady from 2008 (267 vessels) to 2010 (263 vessels), but increased to 325 vessels in 2016.

The number of UK vessels earning 61% or more of their annual fishing income from king scallops increased from 135 in 2008 to 201 vessels in 2014, 202 vessels in 2015 and 203 vessels in 2016. The number of vessels that were less than 61% revenue-dependent on king scallops fell from 132 in 2008 to 106 in 2010, followed by annual fluctuations to 122 vessels in 2016, see Figure 4.1.

[1] MMO figures for 2016

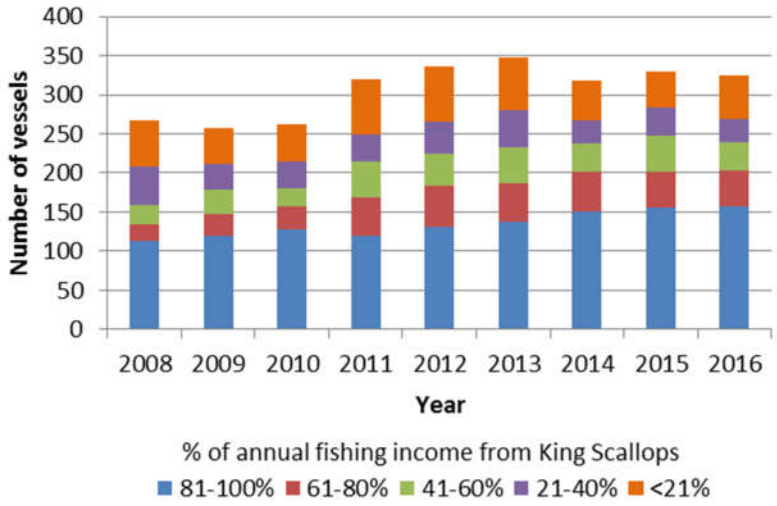

Figure 4.1 Number of vessels in each category of revenue-dependence, not including low activity vessels (annual fishing income <£10K). Source: Seafish, based on MMO data.

4.2.2 Revenue-dependent vessel numbers by length group

The number of vessels that are revenue-dependent on king scallops, and which have fishing revenues (for all species) of at least £10,000 in the year, has steadily increased between 2008 (135) and 2016 (203). The number of 10m-15m vessels more than doubled from 39 in 2008 to 89 in 2016. The number of 15m-20m vessels increased from 37 in 2008 to 51 in 2016. Under 10m vessel numbers fluctuated with a peak from 2011 to 2013 of 43-44 vessels and lows of 35 and 31 vessels in 2008 and 2010 respectively. The number of 20m and over vessels has also fluctuated, with the lowest number of vessels in 2008 and 2016 with 24 and 23 vessels respectively and a peak of 34 vessels in 2013.

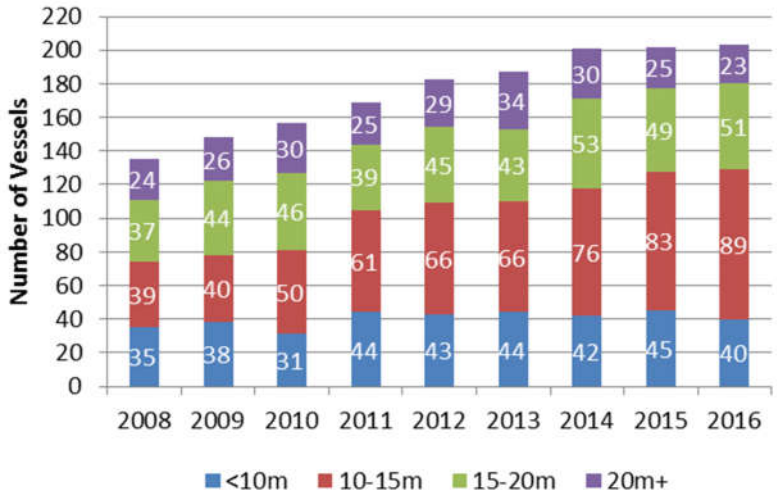

Figure 4.2 Number of UK scallop revenue-dependent vessels by length category, not including low activity vessels (annual fishing income all species <£10K). Source: Seafish, based on MMO data.

5. Fishing effort

Total UK king scallop fishing effort (dredging days at sea) by revenue-dependent vessels (not including low activity vessels) increased from 2008 to 2016. Effort is presented in total annual days at sea (DAS) and total annual hours at sea (HAS). These measures of effort include both towing and steaming time.

The total dredging days at sea by revenue-dependent vessels (not including low activity vessels) increased from nearly 18,500 days in 2008 to over 28,000 days at sea in 2016. Total annual dredging days at sea increased steadily with a drop in 2011, when it fell to just under 21,000 days, before increasing again. The drop in 2011 may have occurred because there was an Area 7 closure for over 15m vessels in October 2011.

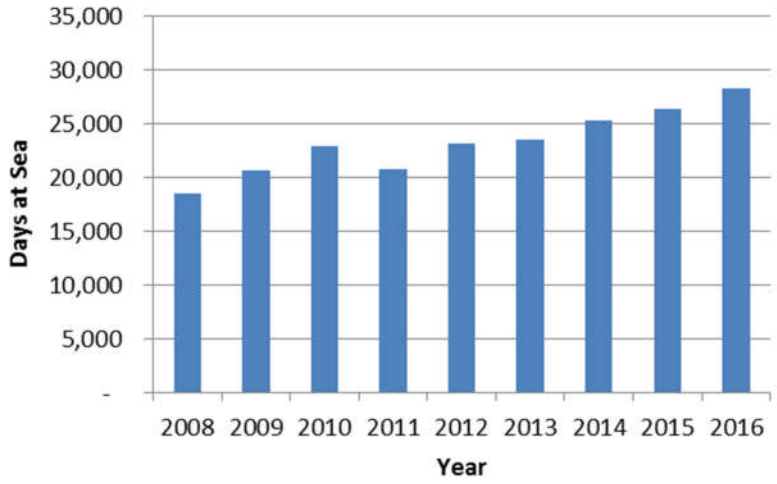

Figure 5.1 Total annual dredging days at sea by scallop revenue-dependent vessels, not including low activity vessels (annual fishing income <£10K). Source: Seafish, based on MMO data.

Total annual hours at sea (with dredges) by revenue-dependent vessels (not including low activity vessels) increased by 47% from around 399,000 hours in 2008 to around 585,000 hours in 2016.

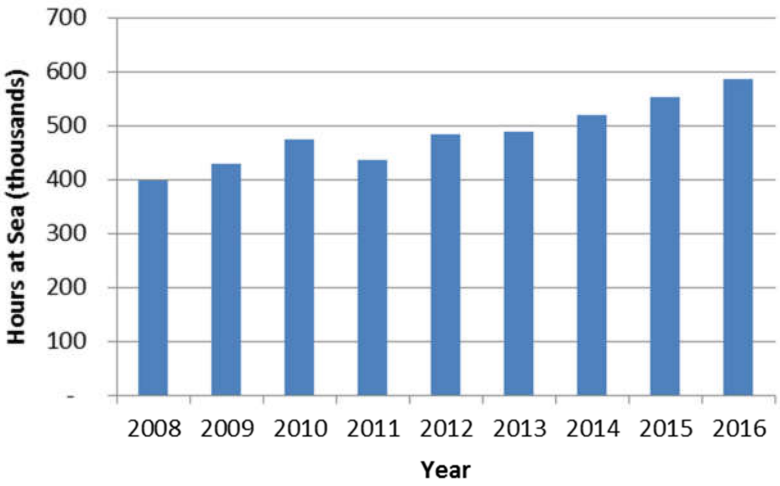

Figure 5.2 Total annual hours at sea by scallop revenue-dependent vessels, not including low activity vessels (annual fishing income <£10K). Source: Seafish, Based on MMO data.

5.1 Days at sea by month

During the three reference years examined (2008, 2012 and 2016) revenue-dependent vessels spent more dredging days at sea in spring and summer months, with effort peaking again in November. In 2008, dredging days at sea peaked in May at around 1,800 days at sea. In 2012, dredging days at sea peaked in March (2,700) and in 2016 dredging days at sea peaked in November (3,000).

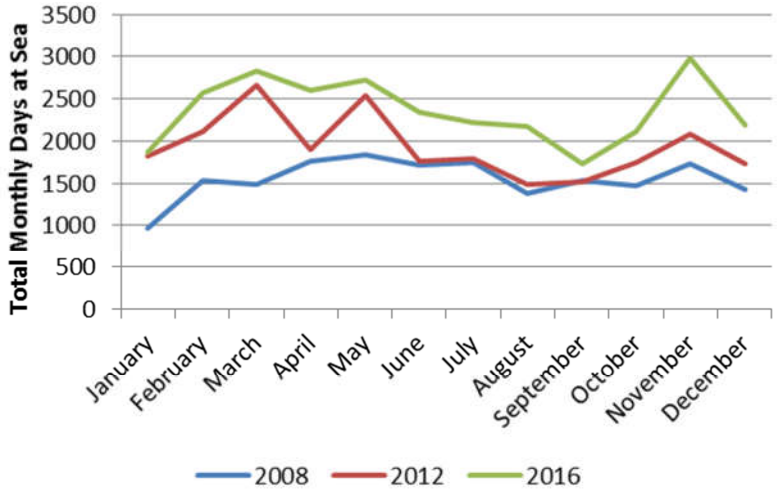

Figure 5.3 Seasonal variation in dredging days at sea, in 2008, 2012 and 2016. Source: Seafish, based on MMO data.

5.2 Days at sea by ICES area

ICES Areas 7a and 6a have been the most attractive fishing areas for king scallops with an increasing number of dredging days at sea by revenue-dependent vessels from 2008 to 2016. Areas 4b and 7e have also seen an increase in effort from 2012 to 2016. Dredging days at sea remained about the same at around 5,300 in area 7e from 2012 to 2016. In area 7d, dredging days at sea decreased to 1,500 days in 2016 after a peak in 2012 of 1,900 days.

The areas shown in Figure 5.4 are the main fishing areas recorded based on the days at sea data. Areas not included in this figure due to negligible effort recorded were 4c, 5b, 7b, -c, -g, -h, -j, -k, and 8a, -d.

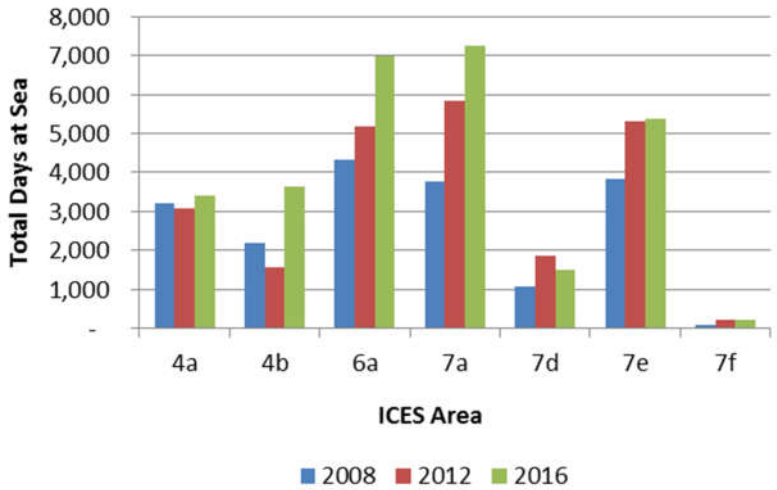

Figure 5.4 Total dredging days at sea by UK scallop revenue-dependent vessels, by ICES area. Source: Seafish, based on MMO data.

5.3 Time series spatial effort map

Scallop fishing effort with dredges in recent years has increased in areas around the west of Scotland, Isle of Man and the English Channel. The maps in Figure 5.5 show areas where revenue-dependent vessels were active with dredges in 2008, 2012 and 2016. In 2008 there were fewer areas with higher total dredging days at sea, with most sub-rectangles in the 0-800 days at sea category. There were three sub-rectangles showing 800-1,600 dredging days at sea and one rectangle showing 1,600-2,400 dredging days at sea. In 2012 and 2016 effort was higher around the Isle of Man and Irish Sea, West of Scotland, Western English Channel and Shetland.

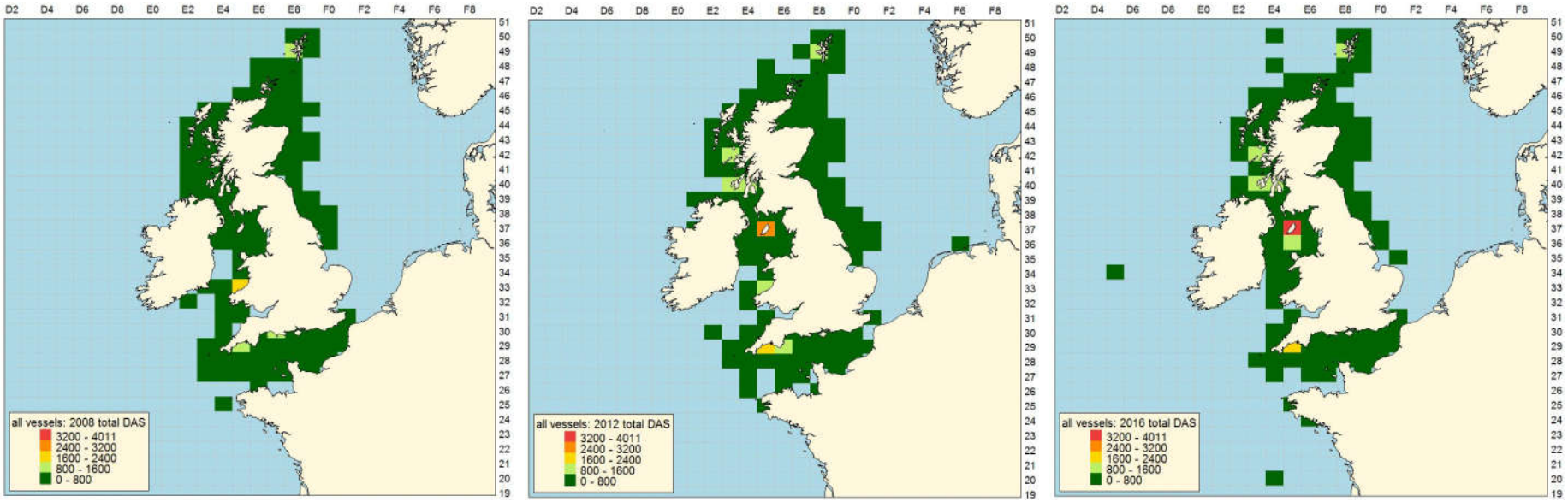

Figure 5.5 Maps showing areas of concentration of dredging days at sea by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

6. King scallop landings

Apart from a drop in 2011, landings of king scallops by revenue-dependent vessels increased from 2008 (around 19,000 tonnes) to 2012 (around 30,000 tonnes) and then decreased to around 24,000 tonnes in 2016.

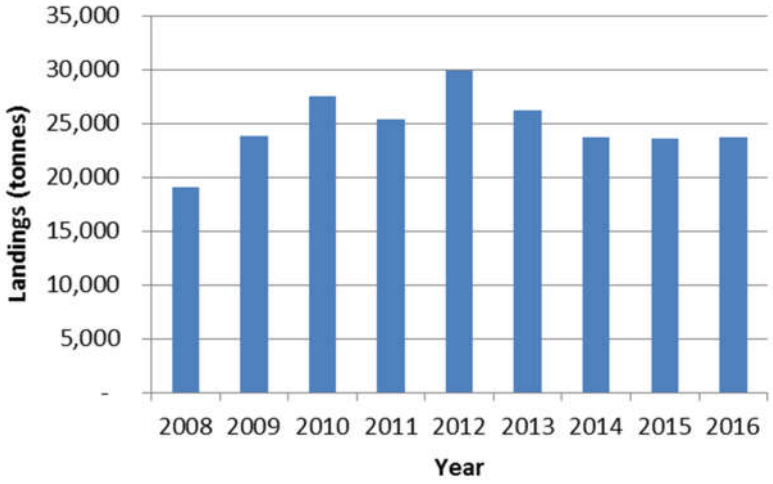

Figure 6.1 Total annual landings of scallops by UK scallop revenue-dependent vessels (not including low activity vessels), 2008 to 2016. Source: Seafish, based on MMO data.

6.1 Landings by month

There are large fluctuations in the total monthly landings of king scallops by revenue-dependent vessels throughout each year. In 2016, landings of king scallops were highest in October and November at 2,300 tonnes and 3,200 tonnes respectively, following a low of around 1,300 tonnes in September. Monthly landings were generally higher in 2012 and 2016 than in 2008.

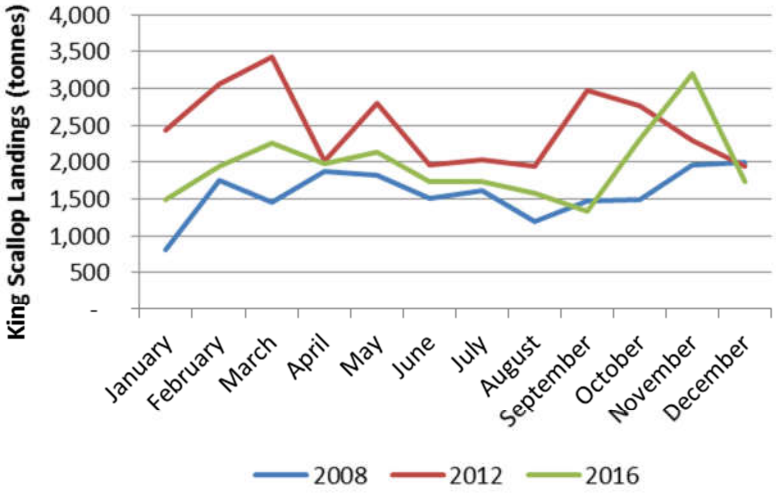

Figure 6.2 Landings of king scallops by month in 2008, 2012 and 2016, by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

6.2 Landings by area

There was a shift in the main king scallop fishing areas between 2012 and 2016. In 2012 the majority of king scallops were caught in ICES areas 7a, 7d and 7e (Irish Sea and English Channel). Although a large percentage of total king scallop landings still came from area 7a in 2016, fewer scallops were

caught in the rest of area 7 and a higher quantity of scallops was caught in areas 4a and 4b (North Sea).

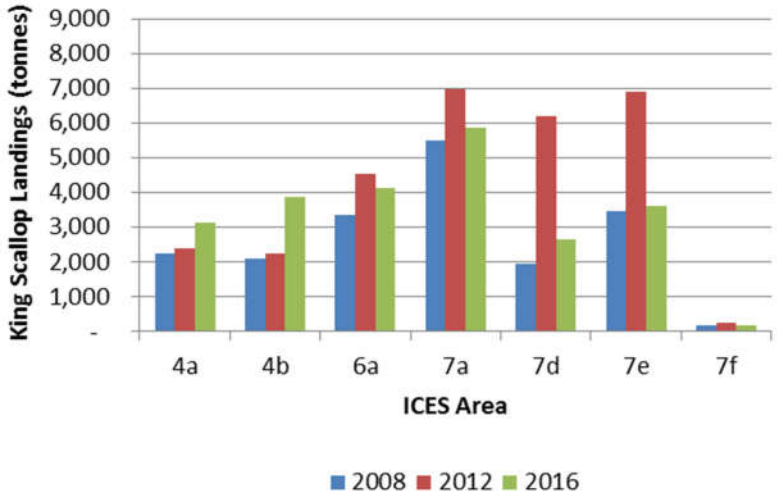

Figure 6.3 Landings of king scallops by UK scallop revenue-dependent vessels, in 2008, 2012 and 2016, by ICES area. Source: Seafish, based on MMO data.

7. Productivity

We have used various ratios of outputs per unit of input to indicate how productive different vessel groups were in various sea areas around the UK. Productivity is the term used in this report to describe the quantity of scallops landed in relation to various measures of inputs into fishing. This would include landings per dredging day at sea, per kW day at sea and per dredge used by the vessels. Efficiency is another term which means much the same in this context, referring to the outputs per unit of input into the fishing operation.

7.1 Landings per unit of effort (LPUE) explored

The operational productivity of fishing vessels is presented as weight of landings per unit of effort. Figure 7.1 shows the landing weight of king scallops (tonnes) and effort (days at sea). Annual changes in effort very closely mirror changes in total landings up to 2012. After 2013, effort (days at sea) increased annually while total king scallop landings decreased annually.

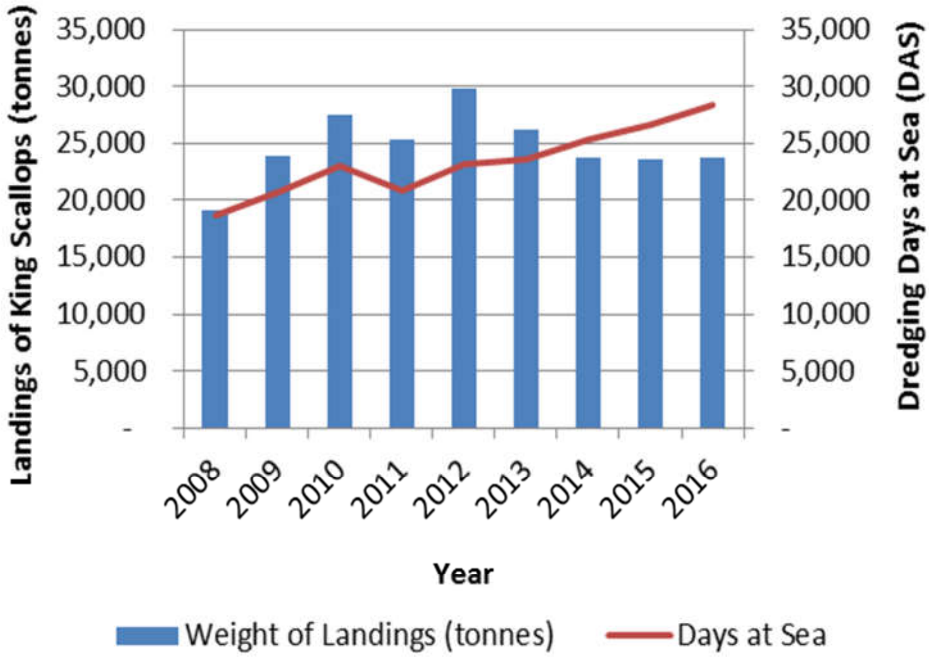

Figure 7.1 Total annual landings of scallops and dredging days at sea by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

7.2 Average landings per day at sea

Average landings (kg) per dredging day at sea by scallop revenue-dependent vessels increased between 2008 and 2012, from around 1,000 kg/DAS to nearly 1,300 kg/DAS. After 2012, efficiency declined to 840 kg/DAS in 2016, see Figure 7.2.

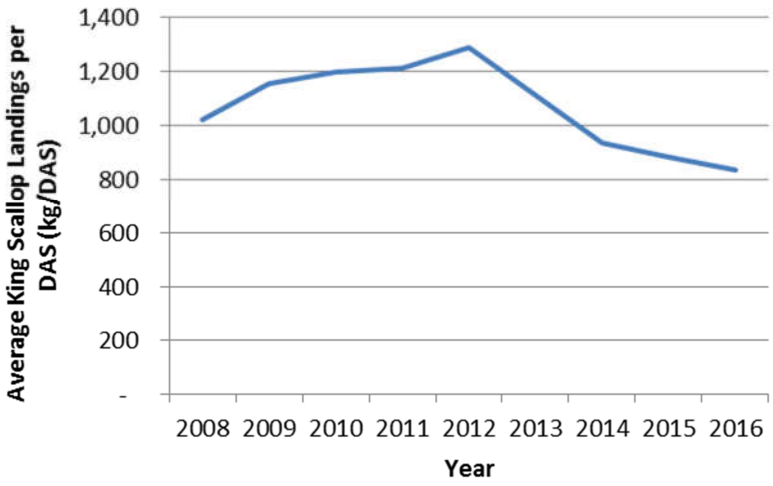

Figure 7.2 Average scallop landings per dredging day at sea by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

7.3 Average landings per kW day at sea

To test if the observed decline in productivity was due to a decline in average engine power of vessels engaged in scallop dredging, we examined average landings (kg) per kW day at sea (days using dredges) for each year in the study period. A dredging vessel with a more powerful engine could, in theory, have an increased fishing capacity; this measure (kg/kW DAS) takes account of fishing capability as influenced by engine size and removes the possibility that a decline in catch per day at sea is due to a decrease in average engine size of vessels catching scallops.

Average landings (kg) per kW day at sea shows the same general story as other measures of productivity or efficiency in scallop dredging, we can therefore conclude that the decline in productivity from 2012 was not due to an average decreased in engine power. There was an increase in landings per kW day at sea between 2008 and 2012, from 3.2 kg/kW DAS to 4.2 kg/kW DAS, followed by a sharp decline to 3.0 kg/kW DAS in 2016.

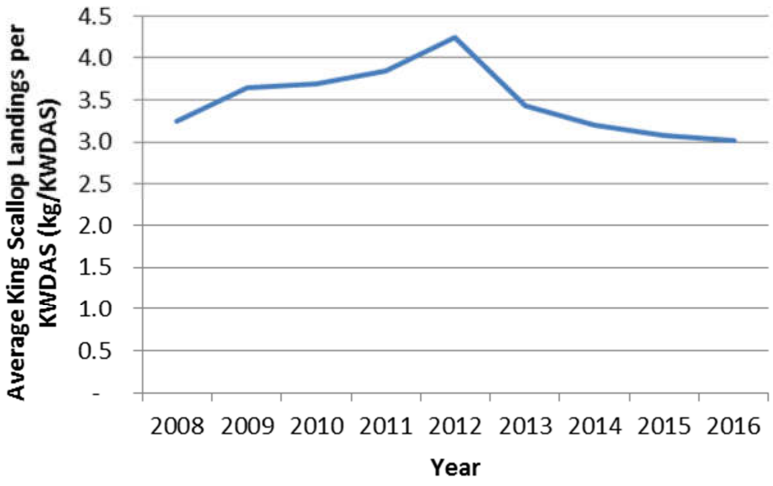

Figure 7.3 Average landings per kW DAS, using dredges, by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

7.4 Average landings per dredge per day at sea

To test if the decline in productivity was due to a decline in the number of dredges used, we examined average landings (kg) per dredge per day at sea from revenue-dependent vessels based on the landings per the number of dredges they towed per day at sea they fished. Each vessel was attributed an assumed number of dredges using a method based on a strong relationship between vessel length and number of dredges used in a sample of vessels[2].

The history of productivity illustrated by this measure was also similar to the general picture based on other measures. We can therefore conclude that the decline in productivity from 2012 was not due to a reduction in the number of dredges used. In 2008 the estimated average weight landed per single dredge (towed by a revenue-dependent king scallop vessel) fishing for one day at sea was 86 kg/dredge/DAS. In 2012, landings per dredge per day at sea peaked at its highest value of 104 kg/dredge/DAS. The peak in productivity in 2012 was followed by a decrease in fishing efficiency per dredge per day at sea to 70 kg/dredge/DAS in 2016.

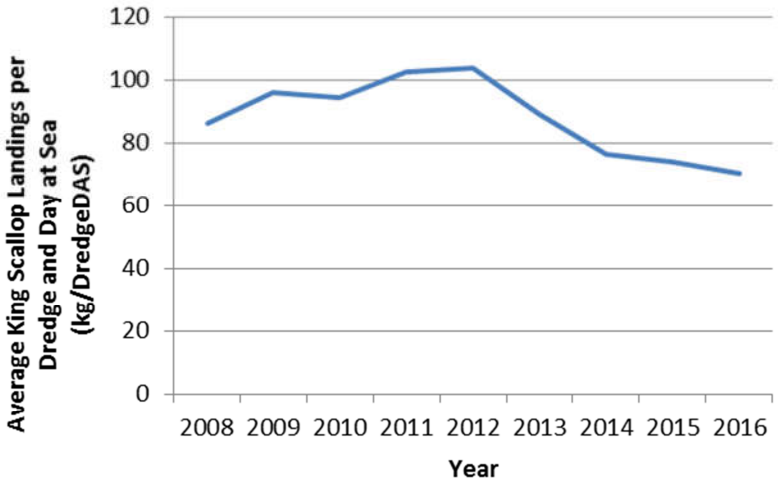

Figure 7.4 Average estimated landings per dredge per DAS by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO.

7.5 Average landings per dredge per hour-at-sea

Based on data provided, an 8 hour trip and 23 hour trip would both be recorded as one day at sea, therefore, landings (kg) per dredge per hour at sea gives an extra degree of precision to estimates of productivity. The average landings per dredge per hour-at-sea are low as hours-at-sea includes steaming time, therefore the trend in the graph, rather than the specific values, should be noted. Since 2009 there has been a downward trend in landings per dredge per hour-at-sea, with the exception of a slight increase observed in 2012.

[2] See appendix one.

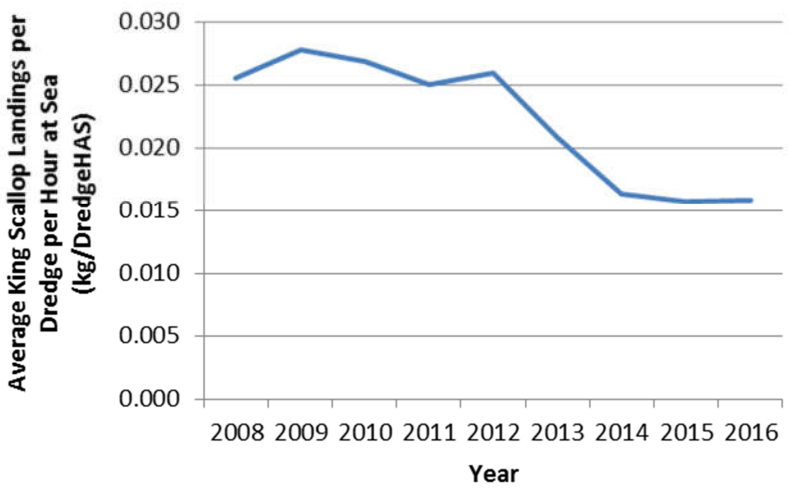

Figure 7.5 Average landings per dredge per hour-at-sea, UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

7.6 Landings per day at sea by ICES area

From 2012 to 2016, productivity (kg landed per DAS) declined in all sea areas other than ICES area 4a (North Sea) where productivity increased slightly. Productivity has declined since 2008 in areas 7a and 7f. Landings per day at sea in area 7d (Eastern English Channel) reached a peak in 2012 of 3,300 kg per day at sea, more than twice as productive as area 7a (Irish Sea) that year. In areas 4a, 4b, and 7d landings per day at sea were similar or higher in 2016 than they were in 2008. In areas 6a and 7e landing per day at sea were lower in 2016 than they were in 2008.

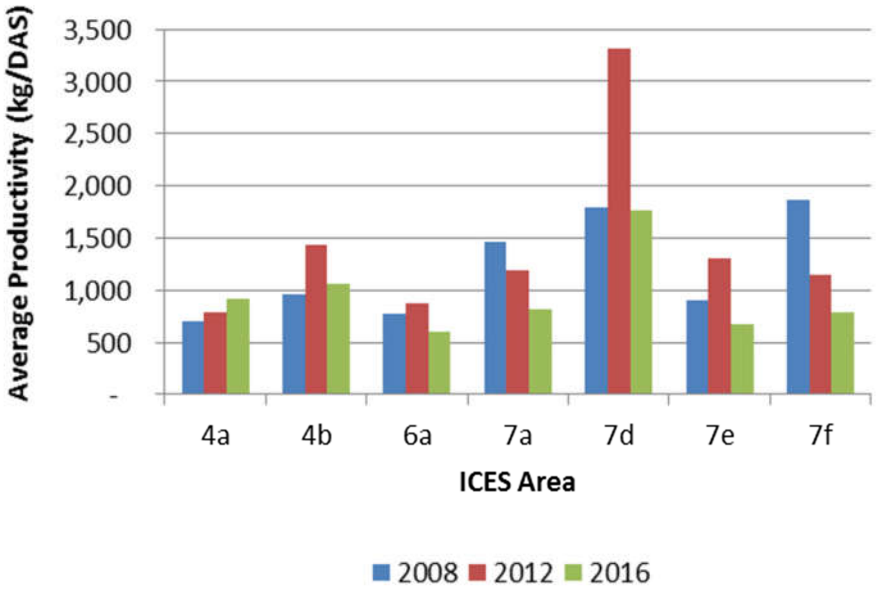

Figure 7.6 Productivity (landings per dredging day at sea) per ICES area in 2008, 2012 and 2016 by UK scallop revenue-dependent vessels. Source: Seafish, based on MMO data.

7.7 Landings, effort and landings per day at sea by sea area

The following sections show landings of king scallop, effort (dredging days at sea) and productivity trends in ICES areas around the UK.

Figures 7.8 to 7.12, showing landings, effort, and productivity figures for five sea areas, are all presented with the same vertical scale, to make it easier to observe the difference in quantities and catch rates between the sea areas.

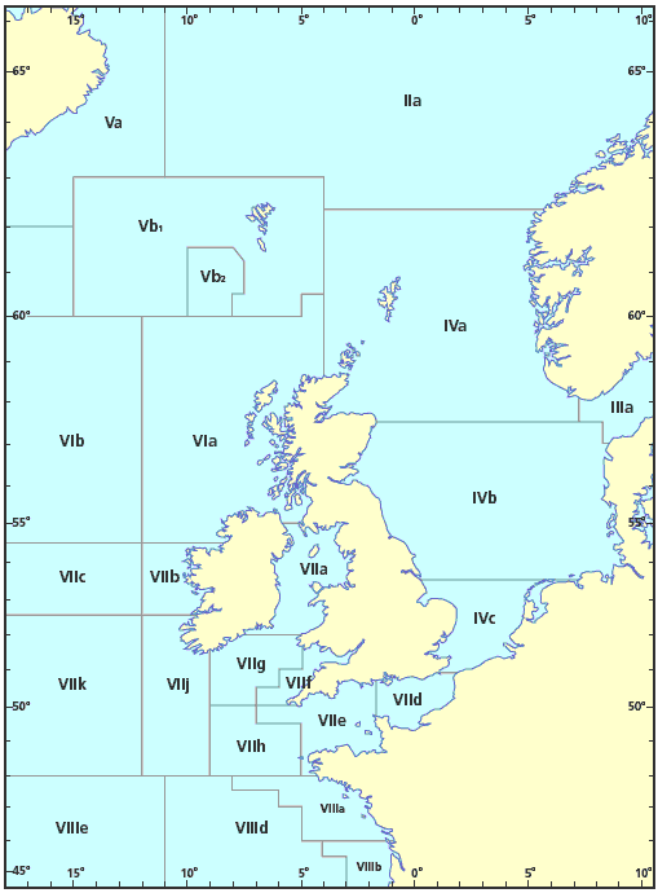

Figure 7.7 Map of ICES areas around the UK. Source: ICES

7.7.1 Area 6a - West Scotland

Annual king scallop landings from area 6a (West of Scotland) steadily declined between 2008 and 2011, see figure 7.8. There was an increase in annual landings in 2012 and levels have fluctuated annually since then. Fishing effort has been on a generally upward trend, with 2016 dredging days at sea at around 7,000 days at sea, around 61% higher than 2008 effort. The most productive year in area 6a was 2012, with an average of 0.87 tonnes of king scallops landed per dredging day at sea by revenue-dependent vessels.

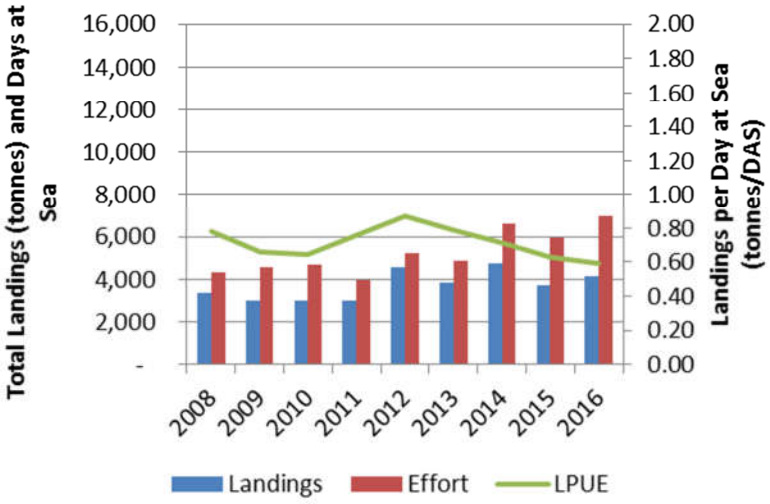

Figure 7.8 Landings of king scallops, dredging days at sea and landings per day at sea in Area 6a, West of Scotland. Source: Seafish, based on MMO data.[3]

7.7.2 Area 7a,g,f - Irish Sea and Celtic Sea

Annual landings from area 7a, g, f (Irish and Celtic Seas) remained largely stable between 2008 and 2011 at around 5,500 tonnes, see figure 7.9. There was an increase in annual landings in 2012 to 7,200 tonnes. After 2012, landings declined annually and in 2015 had fallen to around 4,700 tonnes before increasing to 6,000 tonnes in 2016. Effort (dredging days at sea) increased by 92% from around 3,900 days in 2008 to over 7,400 days in 2016. Productivity declined between 2008 and 2016, except for a minor peak in 2012.

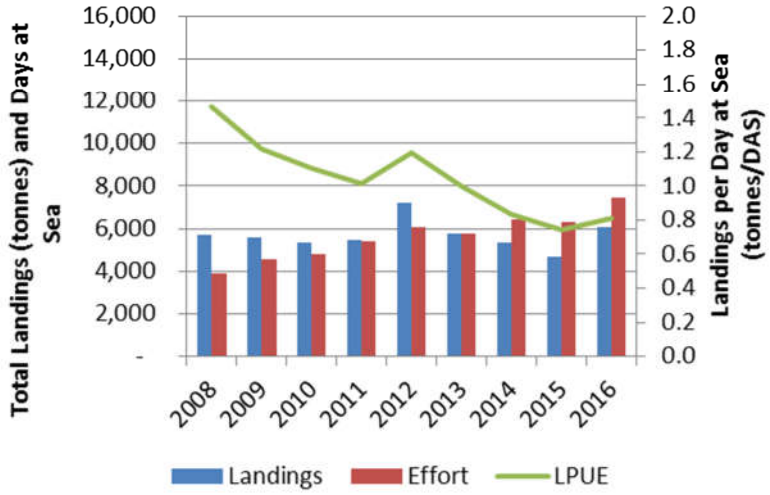

Figure 7.9 Landings of king scallops, dredging days at sea and landings per day at sea in Area 7a, f & g, Irish and Celtic Sea. Source: Seafish, based on MMO data.

7.7.3 Area 7d,e,h – English Channel

Annual landings from area 7d, e and h (English Channel) increased nearly threefold between 2008 (5,500 tonnes) and 2010 (nearly 15,000 tonnes), see figure 7.10. Landings then decreased annually to 6,200 tonnes, near 2008 level, in 2016. Effort increased from nearly 5,000 days at sea in 2008 to

[3] The vertical axes in figures 7.7 to 7.11 are all shown on the same scale to enable a visual comparison of scale between the different sea areas.

8,100 days at sea in 2010. Between 2010 and 2015, effort decreased steadily to 5,600 days at sea in 2015, before increasing to nearly 6,900 days at sea in 2016, 38% higher than 2008 effort. Productivity in the English Channel increased greatly between 2008 (1.1 tonnes/DAS) and 2009 (1.8 tonnes/DAS) where it remained until 2012, after which productivity decreased to 0.9 tonnes/DAS in 2016, 18% lower than in 2008.

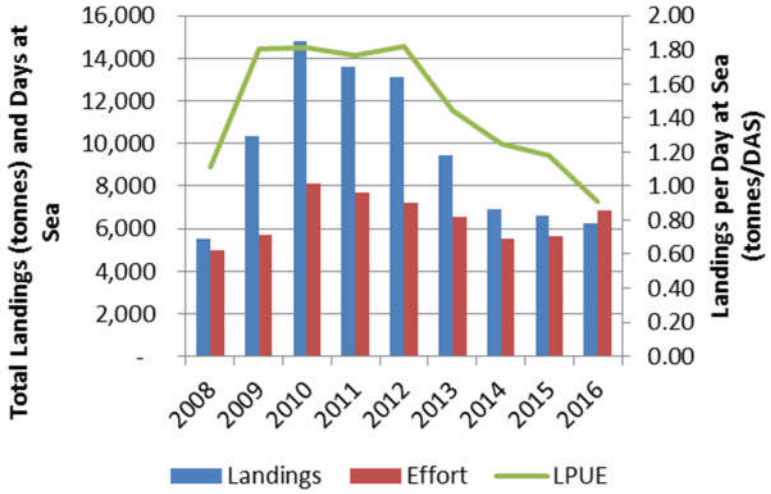

Figure 7.10 Landings of king scallops, dredging days at sea and landings per day at sea in Area 7.d.e & h, English Channel. Source: Seafish, based on MMO data.

7.7.4 Area 4b,c – South and Central North Sea

Annual landings from the North Sea (Area 4b and c) were relatively low but stable until doubling between 2013 (2,500 tonnes) and 2015 (5,000 tonnes), see figure 7.11. In 2016 landings from the North Sea decreased to around 3,900 tonnes. Total effort in the North Sea, also remained relatively stable until doubling between 2013 and 2015 from around 1,900 days to around 4,300 days at sea, then falling to around 3,600 days in 2016, 64% higher than effort in 2008. Productivity in the North Sea was relatively high between 2008 and 2011 at around 1.0 tonne/DAS. In 2012, productivity increased to 1.4 tonnes/DAS before falling to 1.1 tonnes/DAS in 2016, 12% higher than in 2008.

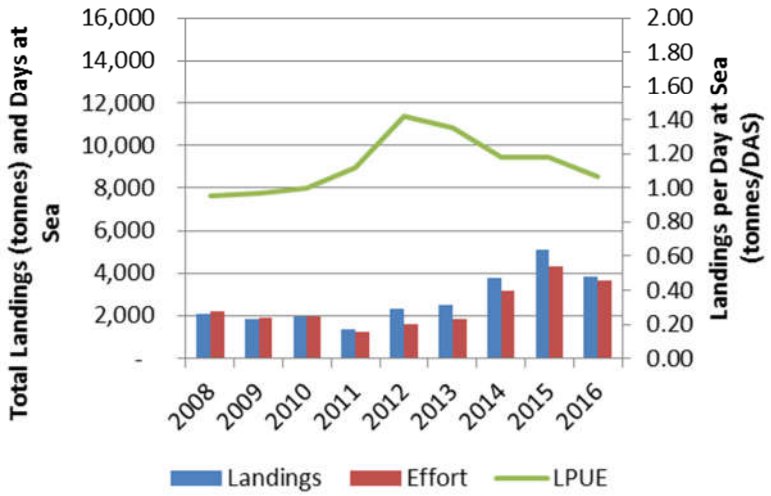

Figure 7.11 Landings of king scallops, dredging days at sea and landings per day at sea in Area 4b,c, North Sea. Source: Seafish, based on MMO data.

7.7.5 Area 4a – Northern North Sea

Annual landings from Area 4a fluctuated between 2,300 tonnes in 2008 and 4,600 tonnes in 2013, before decreasing to 3,100 tonnes in 2016, see figure 7.12. Effort in Area 4a decreased to a low of 2,600 days at sea in 2011 before increasing to 4,700 days at sea in 2013, then declining again to around 3,400 days at sea in 2016, 7% higher than in 2008. Productivity has remained relatively stable, peaking in 2013 at nearly 1.0 tonne per day and again in 2016 at 0.9 tonnes per day, 31% higher than in 2008.

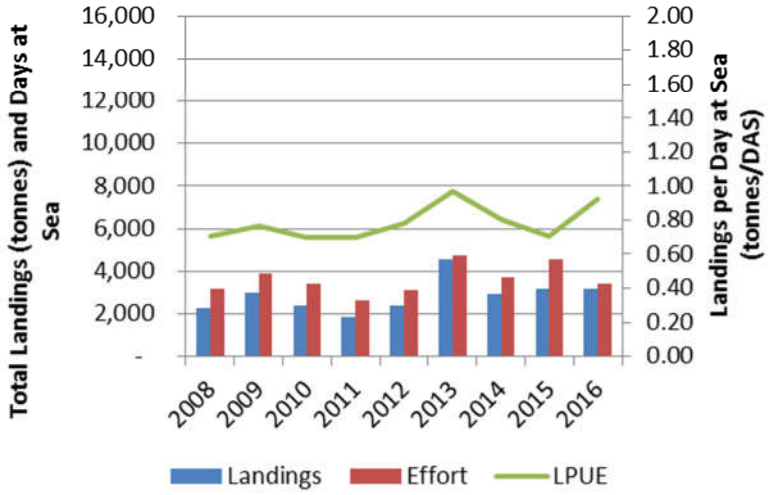

Figure 7.12 Landings of king scallops, dredging days at sea and landings per day at sea in Area 4a, northern North Sea. Source: Seafish, based on MMO data.

7.8 Time series spatial landings per day at sea map

The maps in Figure 7.13 show the areas of different levels of productivity (landings of king scallops per dredging day at sea) by revenue-dependent vessels in 2008, 2012 and 2016. Red and orange squares show areas where fishing productivity was highest. In 2012 there are the most high productivity hotspots, particularly in the English Channel (above 2,100 kg/DAS). By 2016 the extent of these areas had decreased, showing that productivity has decreased since 2012, especially in the English Channel.

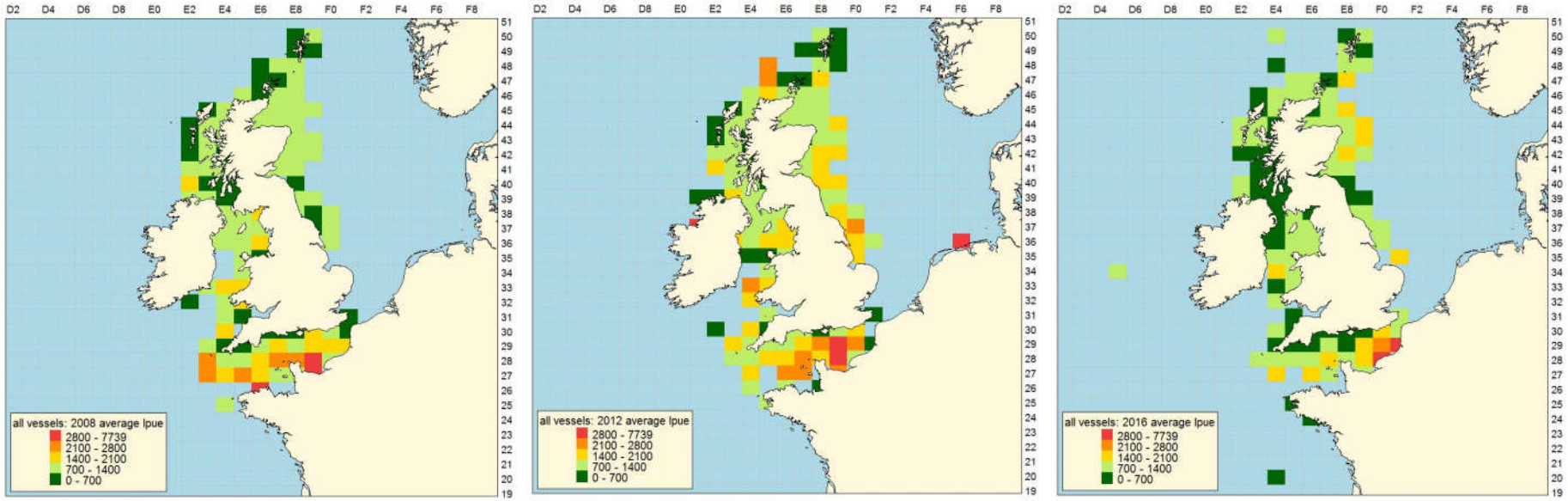

Figure 7.13 Maps showing landings of scallops per dredging day at sea in 2008, 2012 and 2016, by ICES sub-rectangle, for UK scallop revenue-dependent vessels (all lengths). Source: Seafish, based on MMO data.

8. Vessel length group characteristics

Different length groups of scallop revenue-dependent vessels show different landing, effort and operational productivity characteristics. Numbers of vessels in each group vary each year as do the percentage of total scallop landings and total scalloping effort they contribute. In this section these differences are described to illustrate the contribution to total landings and trends in vessel numbers in each length group.

Under 10m vessels

Vessels under 10m in length experienced a large increase in landing productivity after 2009 with a peak in 2012, landing an average of 760 kg/DAS. This then fell to an average of just over 500 kg in 2016. Throughout the study period, under 10m vessels landed approximately 6% of total king scallops landed by all revenue-dependent vessels. The number of under 10m vessels (excluding low activity vessels) that were scallop revenue-dependent each year ranged between 31 and 45 vessels with an annual average of around 40 vessels, see figure 8.1.

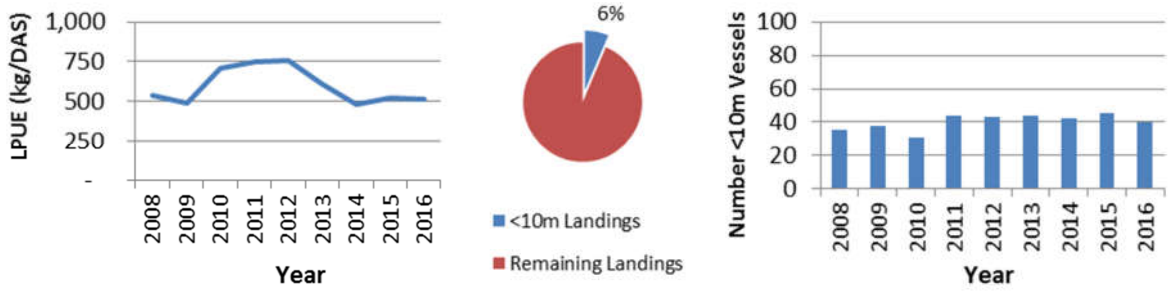

Figure 8.1 Under 10m scallop revenue-dependent vessels: landings per dredging day at sea, landings share and number of vessels (excluding low activity vessels). Source: Seafish, based on MMO data.

10m-15m vessels

Vessels between 10m and 15m experienced a drop in landings productivity between 2008 (700 kg/DAS) and 2009 (620 kg/DAS) but then experienced a large increase to 920 kg/DAS in 2012. After 2012 landings productivity dropped to 640 kg/DAS in 2016. These vessels landed approximately 22% of the total king scallops landed by revenue-dependent vessels from 2008 to 2016. The number of 10m-15m vessels (excluding low activity vessels) that were scallop revenue-dependent in each year, more than doubled between 2008 (39 vessels) and 2016 (89 vessels). In 2016 the 10m-15m length group had the most revenue-dependent king scallop vessels, see figure 8.2.

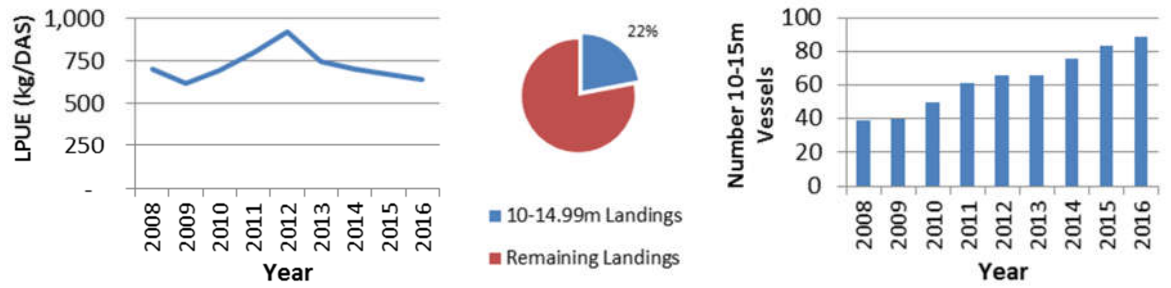

Figure 8.2 10m-15m scallop revenue-dependent vessels: landings per dredging day at sea, landings share and number of vessels (excluding low activity vessels). Source: Seafish, based on MMO data.

15m-20m vessels

Landing productivity for 15m to 20m vessels increased from 980 kg/DAS in 2008 to 1,070 kg/DAS in 2012, before declining to 780 kg/DAS in 2016. Over the nine year study period, these vessels landed approximately 27% of the total king scallops landed by revenue-dependent vessels. The number of vessels in this length group (excluding low activity vessels) increased from 37 vessels in 2008 to 51 vessels in 2016, with slight fluctuations in between, see figure 8.3.

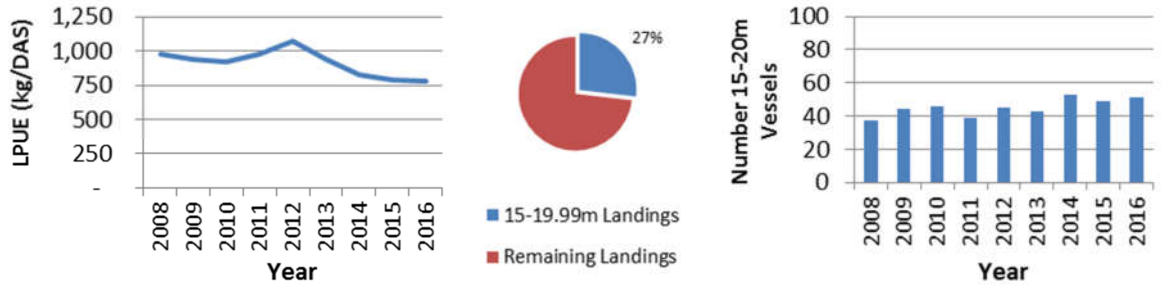

Figure 8.3 15m-20m scallop revenue-dependent vessels: landings per dredging day at sea, landings share and number of vessels (excluding low activity vessels). Source: Seafish, based on MMO data.

20m and over vessels

Landing productivity for vessels 20m and over increased from 2008 (1,600 kg/DAS) to 2009 (2,190 kg/DAS), then stayed relatively stable before dropping by 35% from 2,340 kg/DAS in 2012 to 1,520 kg/DAS in 2016. During the study period vessels over 20m landed approximately 45% of total king scallops landed by revenue-dependent vessels. Even though they accounted for almost half the total landings weight, there were never more than 34 vessels in the over 20m length group and there were only 23 over 20m vessels landing scallops with dredges in 2016.

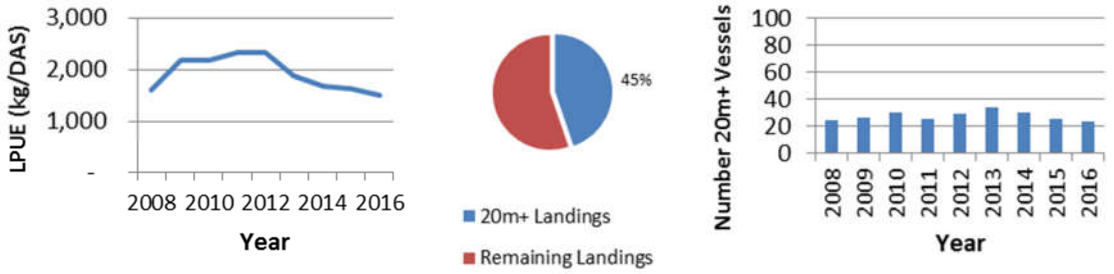

Figure 8.4 20m and over scallop revenue-dependent vessels: landings per dredging day at sea, landings share and number of vessels (excluding low activity vessels). Source: Seafish, based on MMO data.

8.1 Percentage of landings by different length groups

In 2008 the smallest vessels (under 10m) landed the lowest proportion (7%) of king scallops, 10m-15m vessels landed 16% of total king scallop landings, 15m-20m vessels landed 33% and vessels over 20m landed the largest proportion, (44%) of total king scallops landed by revenue-dependent vessels. These proportions changed over the nine year study period as the 10m-15m vessels grew in number and started to land a higher percentage of king scallop landings while the larger 20m and over vessels landed a lower proportion of king scallops, see figure 8.5.

In 2015 and 2016 the 10m-15m vessels landed a higher percentage of total landings than the 15m-20m vessels, due mostly to an increase in the number of 10m-15m vessels.

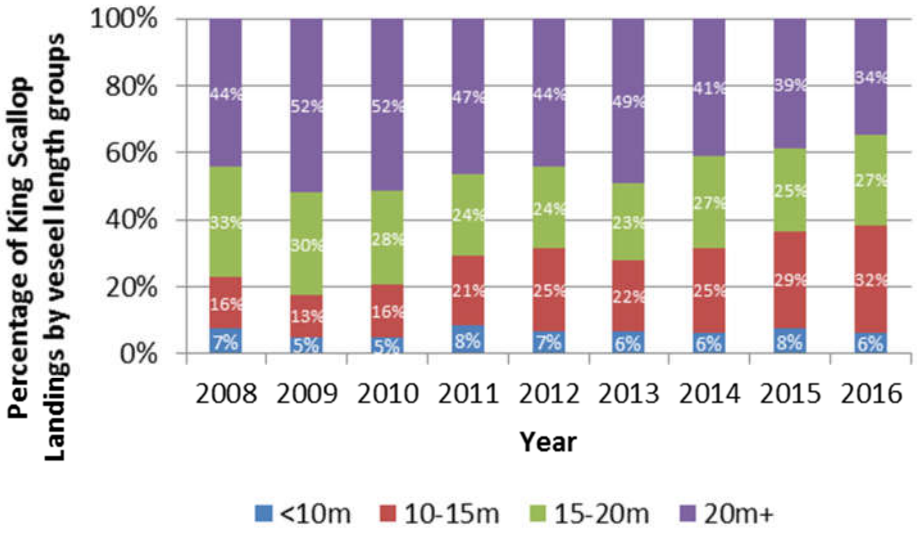

Figure 8.5 Proportion of total king scallop landings by revenue-dependent vessels of different length groups. Source: Seafish, based on MMO data.

8.2 Percentage of effort by different length groups

The proportion of dredging days at sea by the larger vessels (15m-20m and 20m and over) decreased from 34% and 28% respectively in 2008 to 29% and 19% respectively in 2016. In contrast, the percentage of total effort by 10m-15m vessels increased from 23% in 2008 to 42% in 2016, see figure 8.6.

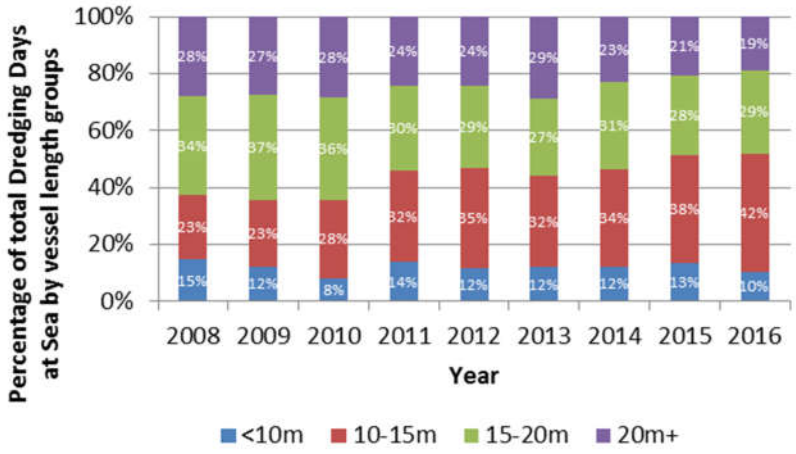

Figure 8.6 Proportion of total dredging days at sea by revenue-dependent vessels of different length groups. Source: Seafish, based on MMO data.

9. Economic performance

9.1 Sector economic overview

Between 2008 and 2012 total fishing income (all species) for revenue-dependent scallop vessels increased from £41 million to £60 million. Operating costs also increased in this period from £34 million (2008) to £48 million (2012). The increase in costs was not proportional to the increase in revenues causing operating profit to increase from £7.8 million (2008) to £13.3 million (2012). In 2014 fishing income dropped to £49 million with operating costs dropping slightly to £42 million and operating profit falling to £7.5 million. In 2016, fishing income continued to increase from 2014 to £59 million and operating costs increased to £47 million which resulted in the highest annual total operating profit in the study period of £13.8 million.

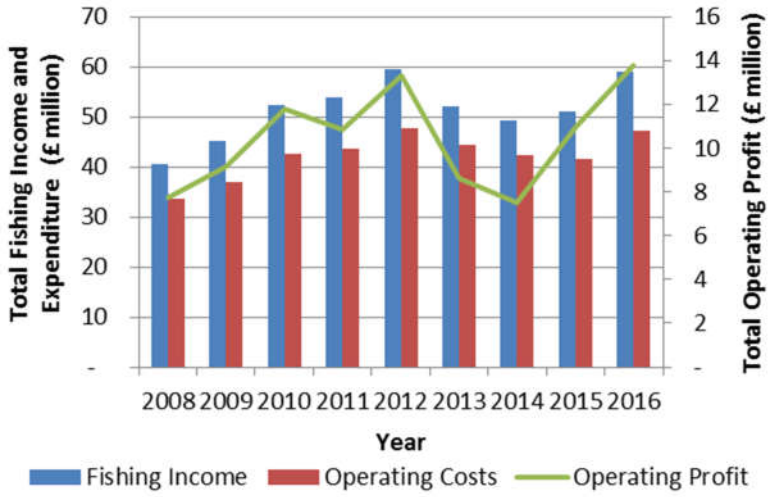

Figure 9.1 Total annual fishing income (all species), operating costs and operating profit of scallop revenue-dependent vessels. Source: Seafish, based on Seafish and MMO data.

9.2 Economic overview by length group

Graphs in this section show the difference in economic performance of the four vessel length groups examined, keeping the vertical axes on the graphs the same to make it easier to visually compared the groups.

9.2.1 Economic overview of under 10m vessels

Total operating profit of under 10m revenue-dependent vessels was £0.6 million in 2008 which nearly doubled to £1.1 million in 2012. In 2013 the total operating profit of under 10m vessels declined again to £0.6 million; however, operating profit recovered in 2015 to £1.0 million and remained steady in 2016, see figure 9.2.

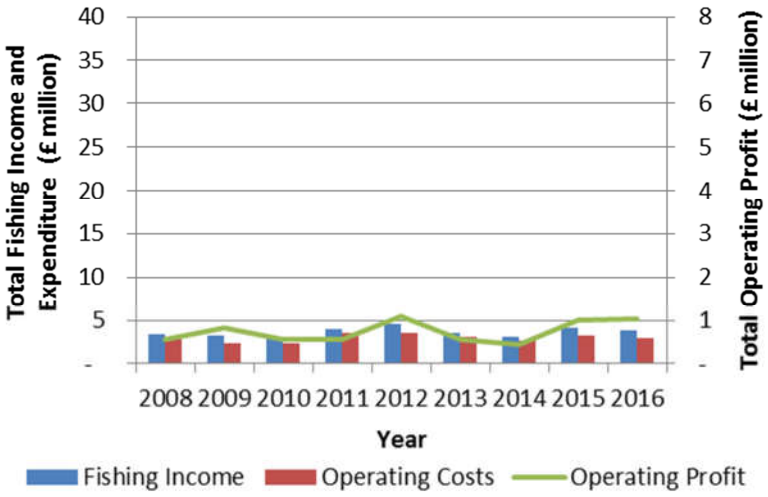

Figure 9.2 Total annual fishing income, operating costs and operating profit of under 10m scallop revenue-dependent vessels. Source: Seafish, based on Seafish and MMO data.

9.2.2 Economic overview of 10m-15m vessels

Total operating profit of 10m-15m scallop revenue-dependent vessels was £0.9 million in 2008 and increased to £3.4 million in 2012. In 2013 total operating profit dropped substantially to £1.6 million; however, total operating profit recovered after 2014, increasing noticeably to £5.3 million in 2016, see figure 9.3.

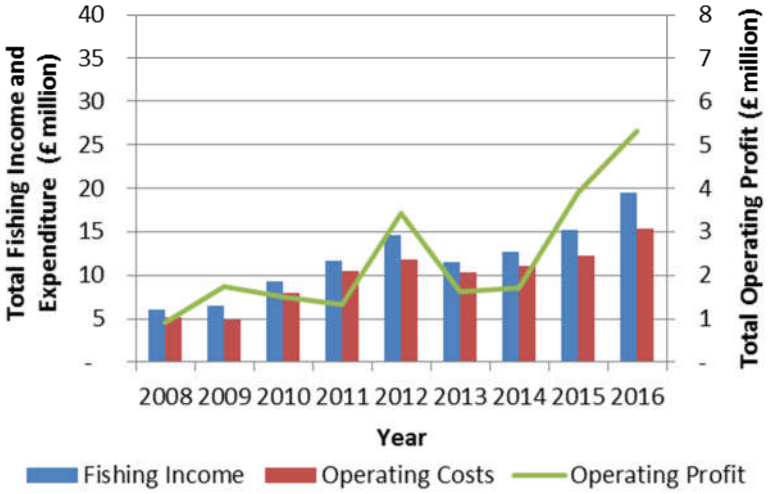

Figure 9.3 Total annual fishing income, operating costs and operating profit of 10m-15m scallop revenue-dependent vessels. Source: Seafish, based on Seafish and MMO data.

9.2.3 Economic overview of 15m-20m vessels

Between 2008 and 2012 total operating profit of 15m-20m revenue-dependent vessels fluctuated between £2.4 and £3.1 million. In 2013 there was a sharp decline in total operating profit to £1.8 million; however, operating profit began to steadily increase again after 2014, reaching £3.2 million in 2016, see figure 9.4.

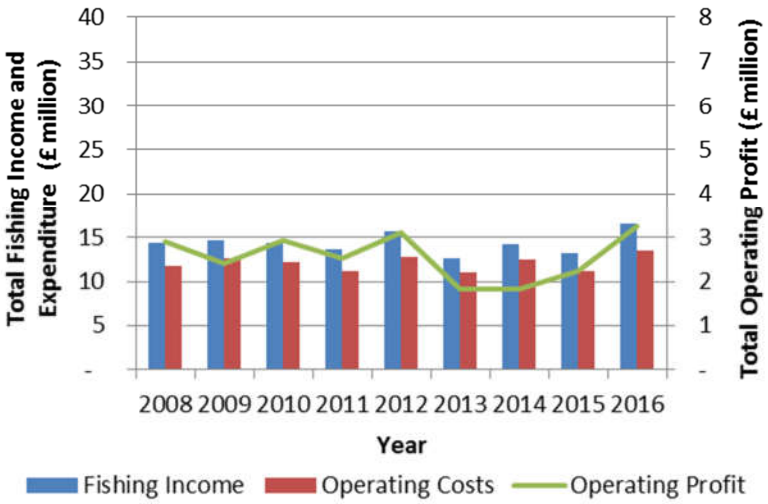

Figure 9.4 Total annual fishing income, operating costs and operating profit of 15m-20m scallop revenue-dependent vessels. Source: Seafish, based on Seafish and MMO data.

9.2.4 Economic overview of 20m and over vessels

Total operating profit of the over 20m revenue-dependent vessels was £3.4 million in 2008. Operating profit then continued to increase until 2010 when it peaked at £6.8 million before dropping to £3.5 million in 2014. After 2014, total operating profit for the 20m and over revenue-dependent scallop vessels began to increase again, reaching £4.3 million in 2016, see figure 9.5.

Figure 9.5 Total annual fishing income, operating costs and operating profit of 20m and over scallop revenue-dependent vessels. Source: Seafish, based on Seafish and MMO data.

9.3 Economic efficiency

9.3.1 Value per Day at Sea (VPUE)

The average value (or income) per dredging day at sea from king scallops landings by revenue-dependent vessels increased then decreased again over the period from 2008 to 2016. In 2008 the average value of king scallop landings per day at sea was £2,050. The average value of king scallop

landings per day at sea rose to £2,360 in 2012 before declining to £1,790 in 2015 and increasing slightly again in 2016 to £1,960, see figure 9.6.

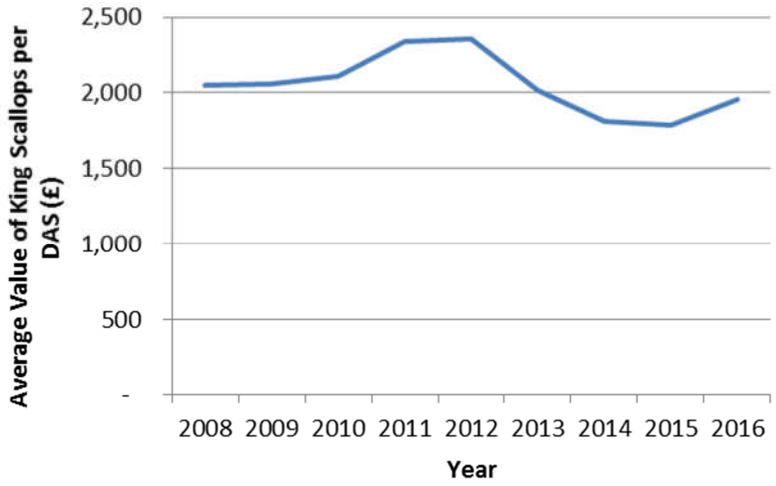

Figure 9.6 Average value (income) per day at sea from king scallops by revenue-dependent vessels. Source: Seafish, based on MMO data (prices are adjusted to 2016 values.)

9.4 Factors affecting operating profits

9.4.1 King scallop and fuel price fluctuations[4]

Fuel constitutes a large proportion of vessel operating costs and the king scallop price heavily influences total revenues (along with quantity landed), therefore these two variables strongly affect vessel operating profit. From 2008 to 2016, annual average fuel prices varied substantially while average sales price for king scallops increased relatively steadily after 2009. Figure 9.7 shows annual average king scallop prices (£/kg) and annual average UK fuel price (£/litre).

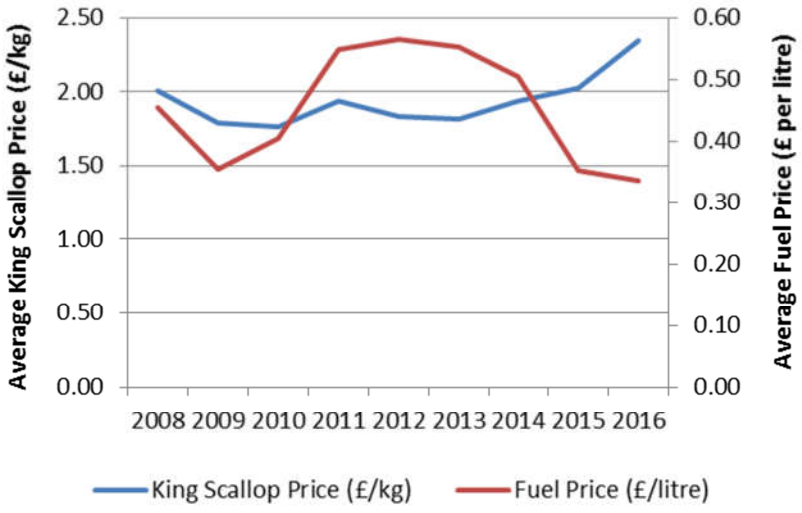

Figure 9.7 Average annual king scallop price and average annual UK fuel price for fishing vessels. Source: Seafish, based on Seafish and MMO data.

[4] All price figures adjusted to 2016 values.

Annual average fuel price per litre fell from £0.45 in 2008 to £0.35 in 2009. Between 2009 and 2012 average annual fuel price increased to £0.57/litre. After 2012 fuel price began to fall again, reaching a low of £0.34/litre in 2016.

From 2008 to 2010, the average annual king scallop sale price declined from £2.01 to £1.76 per kg. Since 2010 the price of king scallops has increased fairly steadily, reaching £2.34 per kg in 2016.

A relatively low fuel price and a high king scallop price is very beneficial to vessel profits and explains the observed increase in operating profits from £7.5 million in 2014 to £13.8 million in 2016, despite the relatively constant amount of king scallop landings during this same period (see Figure 9.1).

9.5 Vessel activity

9.5.1 Continuity analysis

During the period 2008 to 2016 a total of 356 vessels were classed as scallop revenue-dependent in at least one of these years, but only 58 of those vessels were scallop revenue-dependent in all nine years. 116 vessels (excluding low activity vessels) spent only 1-2 years classified as revenue-dependent vessels, 121 vessels spent 3-5 years classified as revenue-dependent vessels and 119 vessels spent 6 or more years classified as revenue-dependent vessels. Vessel owners change the proportion of time they use their vessels to catch scallops from one year to the next so, effectively, vessels join and leave scallop fishing as their main source of revenue according to the owners' decisions each year. Scallop fishing is a dynamic fleet segment as illustrated by the high number of vessels that only spent 1-2 years as revenue-dependent vessels. On the other hand, this evidence shows that there are "core scalloping" vessels which have been used to directly target king scallops for longer periods of time (6+ years out of the nine years considered).

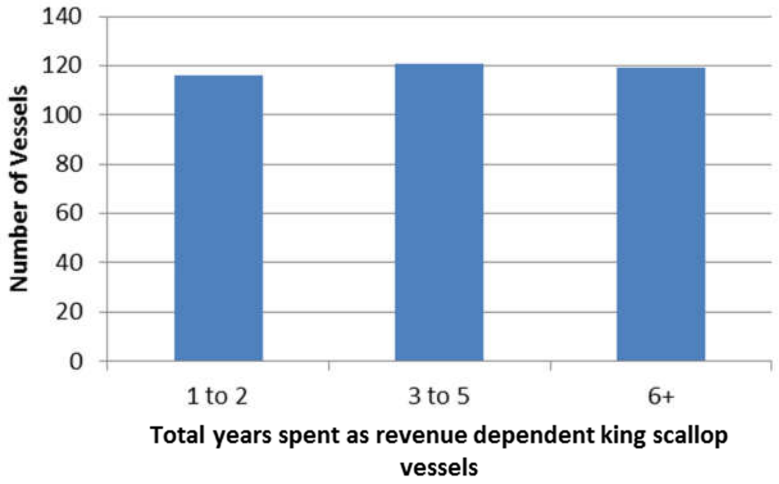

Figure 9.8 Number of vessels (excluding low activity vessels) that spent different numbers of years (not necessarily consecutive) as scallop revenue-dependent vessels from 2008 to 2016. Source: Seafish based on MMO data.

9.5.2 Leavers and joiners

Each year during the study period, vessels were classed as either in or out of the scallop revenue-dependent segment. If they had not been in the group the year before, here we class them as joiners for that year, and if they were not in the group the year after, we class them in that year as leavers. Figure 9.9 shows the number of vessels that were revenue-dependent on king scallops in each year, along with the number of vessels joining the revenue dependent group from another group the previous year and the number of vessels that left the revenue dependent group the following year (vessels which were not revenue-dependent on scallops the following year). The figure shows the main activities of joiners in the year before they became revenue-dependent scallop vessels and the main activity of vessels in the year after they left the revenue-dependent segment.

The number of vessels in the scallop revenue-dependent group increased by 62 vessels over the nine year period, from 153 in 2008 to 215 in 2016. 2016 was the only one year where the group decreased slightly in number (decreased by 3 vessels). Between 2008 and 2009 the fleet increased by 13 vessels, between 2010 and 2011 the fleet increased by 17 vessels and between 2013 and 2014 the fleet increased by 16 vessels. The largest number of new vessels joining the fleet occurred in 2014 (55 vessels) followed by 2015 (49 vessels). The largest number of vessels leaving the fleet occurred after 2010 (36 vessels were in the group in 2014 but were not classed as scallop revenue-dependent in 2015).

In 2009, when 41 vessels joined the revenue-dependent group, the majority of the activity in the year before was either demersal trawl/seine (11 vessels), inactive/low activity (8 vessels) or catching nephrops (7 vessels). In 2013, there were 35 vessels that had been in the group in 2012 but in 2013 were no longer classed as scallop revenue dependent. Of these, the biggest single new activity in 2013 (for 16 vessels) was non-revenue dependent dredging (<61% revenue-dependent on king scallops). Then in 2014, when 55 vessels joined the revenue-dependent group, the biggest single previous activity (22 vessels) was non-revenue dependent dredging (<61% revenue-dependent on king scallops in the year before). After being in the group in 2015, 31 vessels left the scallop revenue dependent group, with the biggest group of leavers (9 vessels) classed as demersal trawl/seine vessels in 2016.

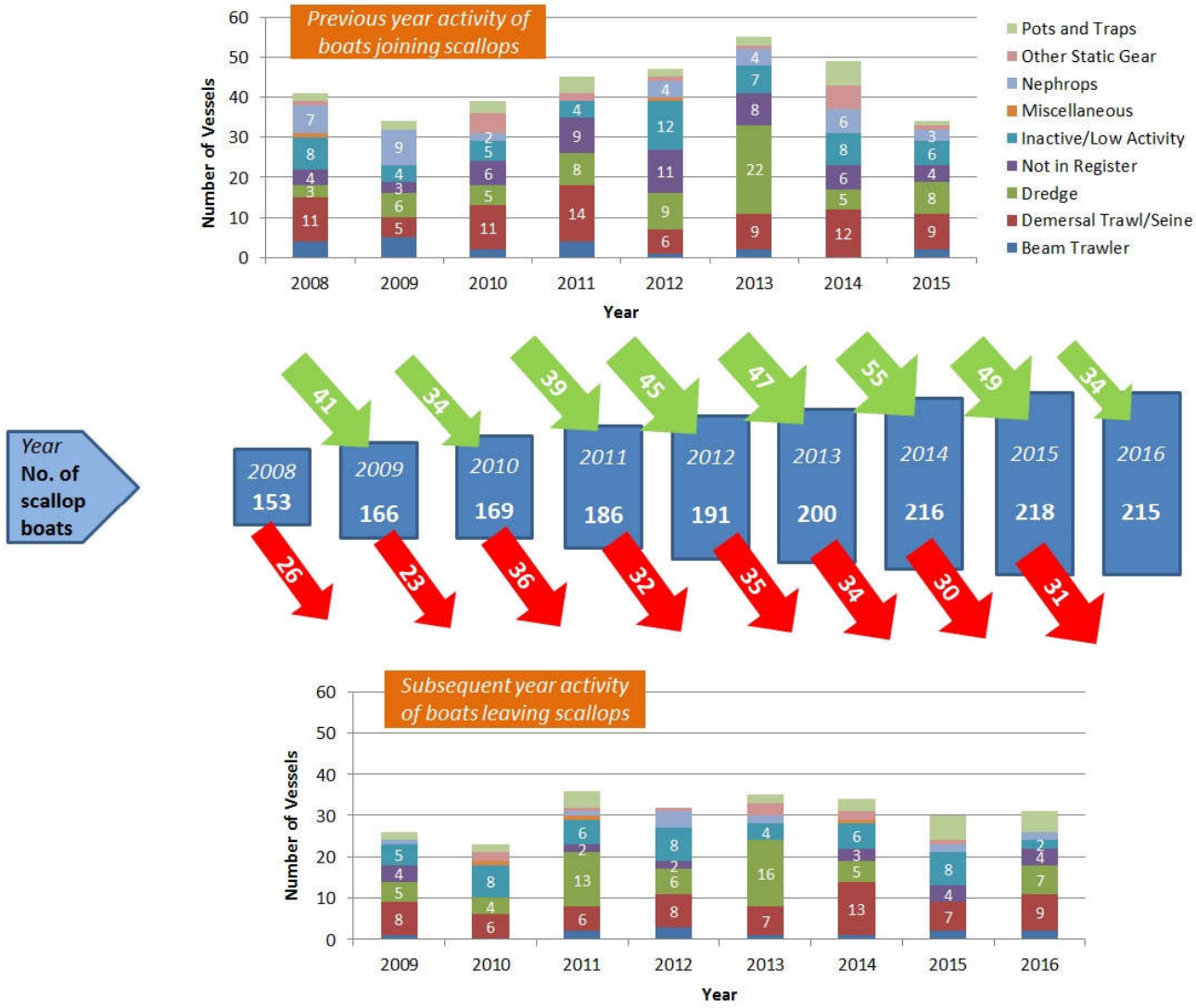

Figure 9.9 Previous year and subsequent year activity of vessels joining and leaving the scallop revenue-dependent group, including low activity vessels. Source: Seafish, based on MMO data.

10. Conclusions

Analysis conducted for this report shows clear evidence over the last nine years of increasing fishing effort and declining catch rates for vessels that are revenue dependent on scallops. There was a 53% increase in dredging days at sea by scallop revenue-dependent vessels between 2008 and 2016.

Total fishing effort to catch scallops has increased, in part due to a steady increase in the number of scallop revenue-dependent vessels, including low activity vessels, increasing from 153 in 2008 to 215 in 2016. Vessels in the 10m-15m length group more than doubled in number from 2008 to 2016.

Technical efficiency of scallop-dependent vessels has declined by all the measures used, catch per dredging day at sea, catch per kW day at sea, catch per hour at sea and catch per dredge per day at sea. Most sea areas around the UK and all vessel length groups have experienced declining catch rates. The evidence presented in this report does not enable any conclusions to be drawn about the principal reason or reasons for declining catch rates, though it does exclude some possible causes, including the implementation of the Western Waters management regime on 15m and over vessels, an overall increase in engine power, and an overall increase in number of dredges.

Business efficiency, reflected by operating profits, declined from a peak in 2012 but recovered in 2015 and 2016, due to a favourable combination of higher sales prices for king scallops and lower fuel prices in the last few years. Because of the decline in productivity across all length segments of the fleet, the sector is vulnerable to price changes for fuel and for king scallops.

Since there are no quotas limiting catches of scallops, scallop dredging is an attractive option for vessel owners who do not have good options for catching quota species. The attractiveness of fishing for scallops is illustrated by the high number of vessels each year that were brought into or taken out of scalloping as a major activity instead of their previous activity or inactivity. The overall upward trend in revenue-dependent vessel numbers shows the increasing attractiveness of scallop dredging.