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Predicted impacts of proposed management measures in the Isle of Man king scallop (*Pecten maximus*) fishery to be introduced in the 2016/2017 fishing season

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Summary

This report examines the likely impacts on the fishing fleet of management measures proposed for the 2016/2017 king scallop fishing season and beyond. There are currently 156 (as of 27th June 2015) vessels licensed to fish king scallops within Manx territorial waters. If the number of licenses was capped at its present level, current licence holders would not be impacted; however, there would be impacts on vessels wishing to enter the fishery in the future. The introduction of a track record period from within the period 2010 to 2015 would exclude a number of currently licenced vessels from the fishery; the exact number of vessels excluded is dependent on the fishing seasons used for the track record period and the number of qualifying days stipulated. However, of the 156 currently licenced vessels only 122 of these vessels have recorded landings in the IFISH database during at least one of the last five Isle of Man king scallop fishing seasons (e.g. between 2010/2011 and 2014/2015). Using ICES statistical rectangle 37E5 as an indicator for the territorial sea, analysis of the logbook data show that there has been a year on year increase in the number of unique vessels fishing for king scallop since the 2010/2011 fishing season. In addition, there had been year on year increases in landings of king scallops from 2011/2012 to 2014/2015 until landings fell during the 2015/2016 fishing season. A corresponding decrease in LPUE (tonnes per kW Day) since 2012/2013 is also evident. The proposed management measures aim to reduce the latent fishing capacity in the fleet, reduce current effort levels and ensure the long term sustainability of the stock.

All data used in the current analysis are complete up to 17th June 2016.

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1. Introduction

The Isle of Man's king scallop (*Pecten maximus*) fishery is prosecuted from 1st November to 31st May by vessels using toothed, Newhaven, dredges. Management of the fishery differs between an inner 0 to 3 nautical mile zone, and an outer 3 to 12 nautical mile zone, with more stringent regulations in the inner zone. Vessels from the Isle of Man, Wales, Scotland, England and Northern Ireland can all fish for king scallops in the Isle of Man's territorial sea. Thus any new management regime may impact upon fishers and processors throughout the British Isles.

Table 1. Current (2015/2016 fishing season) and additional proposed (2016/2017 fishing season) management measures within the Isle of Man's *Pecten maximus* fishery.

Current (2015/2016)	Additional Proposed (from 2016/2017)
Curfew: 18:00 to 06:00 [0 – 12 nm zone]	Cap licences at existing levels
≤15.24 m vessel registered length [0 – 3 nm zone]	Track record period (1 st Nov 2010 to 31 st May 2013)
VMS required	Track record period (1 st Nov 2011 to 31 st May 2014)
Minimum landing size 110 mm	Track record period (1 st Nov 2012 to 31 st May 2015)
Closed season: 01/06 to 31/10	Establishment of a King Scallop Advisory Board
Closed areas	Tow bar length restrictions
Maximum of 9 teeth per dredge	Introduction of a weekend ban
Aggregate dredge width of 762 cm [0 – 3 nm zone]	
Aggregate dredge width of 1067 cm [3 – 12 nm zone]	
Maximum tow bar diameter of 185 mm	
Minimum tooth spacing of 75 mm	
Minimum belly ring internal diameter 75 mm	
Minimum dredge net mesh of 100 mm	
French dredge prohibited	

1.1. Current Isle of Man king scallop licences

Until now any vessel with an engine power less than or equal to 221 kW, or engine power above 221 kW but with sufficient track record of having fished for king scallops between 2008 and 2010, may obtain a licence to fish for king scallops within the territorial sea. As of 27th June 2016 156 vessels hold licences to fish king scallops in the Isle of Man territorial sea; 36 are less than 10m length overall (LOA), 64 are between 10m and 14.99m LOA and 56 are 15m LOA or more.

1.2. Capacity within the fleet

Landings of king scallops from ICES statistical rectangles 36E5, 37E5 and 38E5 have shown a general increasing trend since 1992/1993, however, landings from the 2015/2016 fishing season were lower than for the previous three fishing seasons (Figure 1 and Figure 2C).

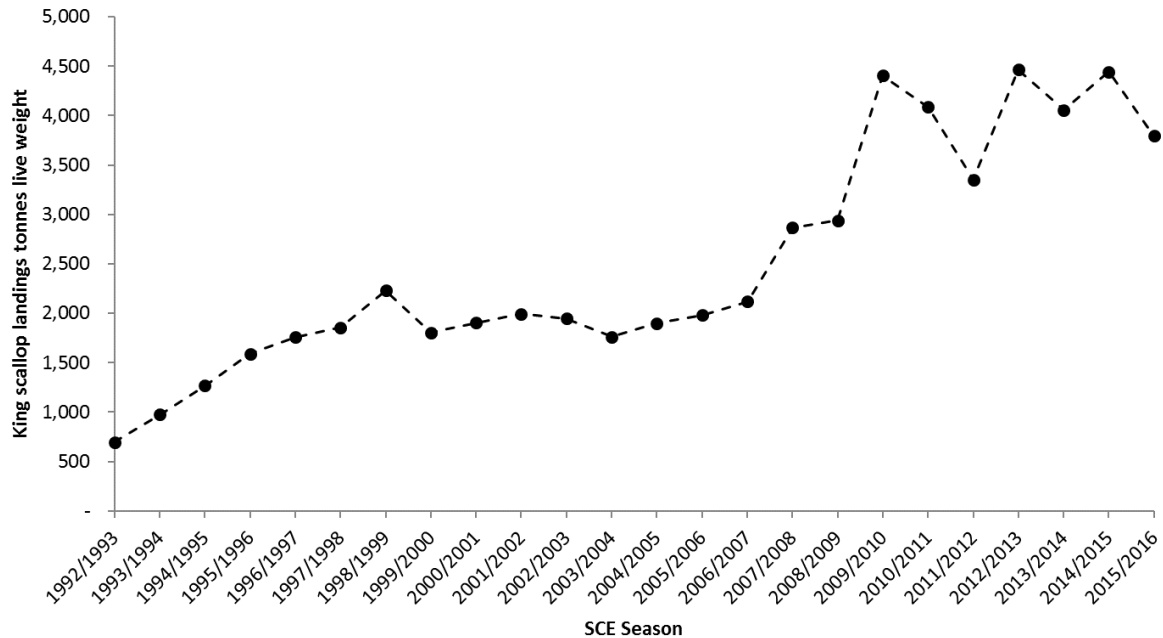


Figure 1. Landings (live weight) of king scallops from 36E5, 37E5 and 38E5. Data are for fishing seasons (1st Nov year to 31st May year+1) Data source: IFISH and Isle of Man Government, DEFA. *N.B. this data includes all vessels fishing for king scallops and not only those vessels that are currently licenced to fish for king scallops within the Isle of Man's territorial sea.*

Using ICES Statistical Rectangle 37E5 as an indicator for the Isle of Man territorial sea, analysis of the logbook data shows that there has been a year on year increase in the number of unique vessels fishing for king scallops since the 2010/2011 fishing season (Figure 2A). In addition, there have been year on year increases in landings of king scallops from 2011/2012 fishing season until the 2014/2015 fishing season, however landings during the 2015/2016 fishing season were lower than in previous years (Figure 2C). A corresponding decrease in LPUE (tonnes per kW Day) has also been evident since the 2012/2013 fishing season (Figure 2D). In order to address this increase in effort and landings a number of additional management measures for the 2016/2017 fishing season have been suggested within the attached consultation (e.g. Table 1). This report examines the likely impacts on the scallop fishing fleet of new management measures proposed for the 2016/2017 and beyond king scallop fishing season.

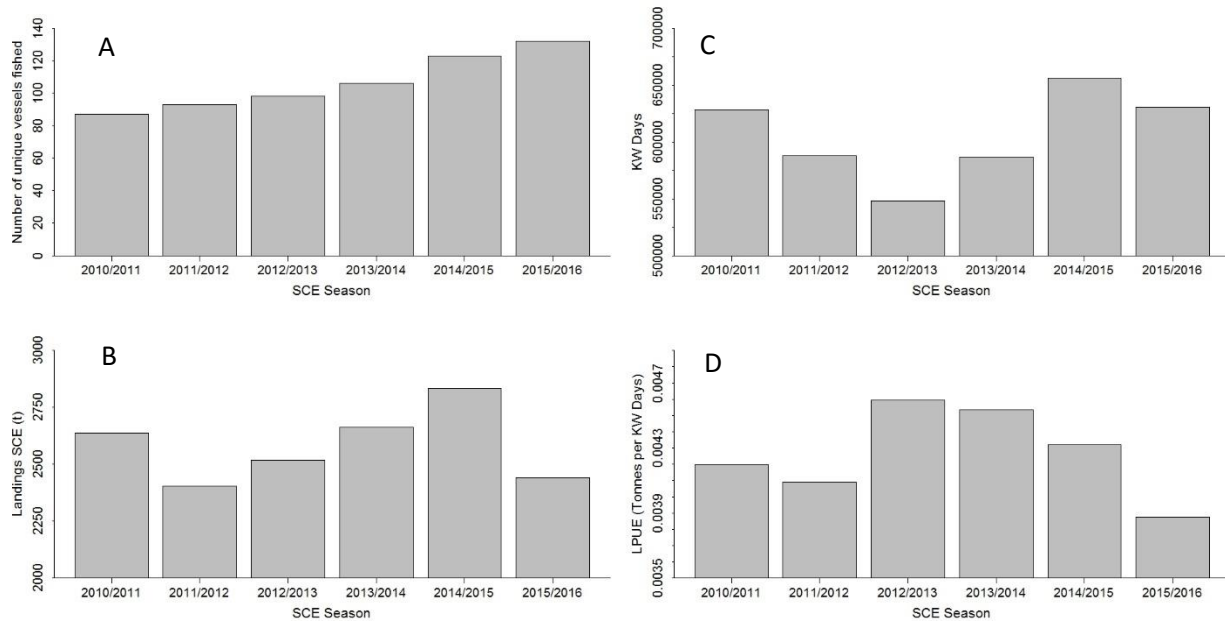


Figure 2. **A.** Number of unique vessels reporting landings of king scallops from ICES statistical rectangles 37 E5. **B.** Reported landings (tonnes live weight) of king scallops from ICES statistical rectangles 37 E5. **C.** Effort in kW Days from vessels targeting king scallops in ICES statistical rectangles 37 E5. **D.** Landings per unit effort for vessels targeting king scallops in ICES statistical rectangles 37E5. Data are for fishing seasons (e.g. 1st Nov y to 31st May y+1) Data sources: IFISH and Isle of Man Government, DEFA. *N.B. this data includes all vessels fishing for king scallops and not only those vessels that are currently licenced to fish for king scallops within the Isle of Man's territorial sea.*

1.4. Latent capacity within the fleet

Although 156 vessels are licenced to fish for king scallops within the territorial sea, the number of currently licenced vessels (as of 27th June 2016) which have recorded landings of king scallops within ICES statistical rectangles 36E5, 37E5 or 38E5 in 2010/2011, 2011/2012, 2012/2013 and 2013/2014 and 2014/2015 was 74, 74, 84, 95, 110 and 122 respectively (as landings are not resolved to the territorial sea some landing records from these vessels may have come from outside Manx waters). A consistent latent fishing capacity therefore exists within the Isle of Man's licenced queen scallop fishing fleet.

1.5. Increasing effort within the fleet

There have been annual increases in the number of vessels licenced to fish for king scallops within the Isle of Man's territorial sea that are prosecuting the king scallop fishery within ICES rectangles 36E5, 37E5 and 38E5. In addition to those vessels that are currently licenced to fish within the territorial sea, up until now any UK vessel with ≤ 221 kW engine capacity has been eligible to receive a licence provided it had a Vessel Monitoring System (VMS) installed and paid the appropriate licence fee. Consequently, vessels currently involved in other fisheries (e.g. *Nephrops*) could diversify into the king scallop fishery if their target stock became depleted or if new regulations affecting their ability to efficiently

prosecute other stocks were imposed. Evidence of vessels diversifying into king scallops may already have been seen with the increase in vessels entering the fishery during previous fishing seasons (Figure 2A). The potential for displacement of effort from other fisheries is an issue of increasing concern in the context of new EU regulations on bycatch and discards that commenced in 2015.

1.6. Potential consequences of increasing effort

An increase in the number of vessels entering the fishery could have many potential ecological, environmental and socio-economic impacts. In addition to excessive fishing on traditional fishing grounds the environmental footprint of the fishery could expand as effort intensifies and spreads out to catch the stock. As well as resulting in additional vessels within the fleet, new entrants, being inexperienced in the fishery, could lead to inefficient fishing behaviours such as increased prospecting until they have learnt the specifics of the fishery. Expanding the number of interested parties within the fishery would have socio-economic impacts on those currently involved. Vessels which traditionally target king scallops would lose income in the face of increased competition, adversely affecting the ability of those fishers to run a viable business. Additionally, secondary industries could also be impacted with variable catches of potentially decreasing quality affecting processors, who rely on year round supply of product, ultimately impinging upon their ability to sustain full time employees.

Furthermore, the effects of king scallop dredging on recruitment of both king and queen scallops should be considered. For successful recruitment to occur it is essential that there is sufficient suitable habitat for settlement of young scallops (for example, there is a positive relationship between the presence of macroalgae and maerl and the abundance of juvenile scallops; Howarth *et al.*, 2011) (Beukers-Stewart & Beukers-Stewart, 2009). However, one of the threats to these habitats is the secondary effects of mobile fishing gear (e.g. king scallop dredging), which can lead to the removal of epifaunal organisms that contribute to habitat complexity causing wide-scale changes in benthic habitats and communities (e.g. Kaiser *et al.*, 2000). Adequate protection of these habitats is required in order to limit the direct impact of fishing activities such as dredging on the damage or removal of the habitats on which these scallop species rely for settlement (Beukers-Stewart & Beukers-Stewart, 2009). During a fishing intensity trial in Cardigan Bay, Wales, it was found that a period of over four months without fishing was necessary to allow the effects of most dredging on the physical habitat to dissipate (Murray *et al.*, 2015). However, for areas fished at higher intensity (>3.8 time swept) a period of more than 10 months was required to allow the recovery of the physical environment (Murray *et al.*, 2015). In addition, negative impacts on epifauna, including species living attached to the substratum which are used by young scallops for settlement, were observed during the fishing intensity trials when areas were fished at moderate intensity (>2.0 time swept) (Lambert *et al.*, 2015).

Therefore, restricting the number of times the seabed is impacted and ensuring adequate recovery periods could help minimise the negative impacts of scallop dredging on future recruitment of king and queen scallops.

1.7. Additional proposed management measures (2016/2017 fishing season and beyond)

1.6.1. Licence Cap

Under this proposal licences would be capped at the present level (156 as of 27th June 2016).

1.6.2. Track Record Period

Were this proposal to be adopted, in order to qualify for a licence a vessel would have to have reported landings for a specified number of days from 36E5, 37E5 or 38E5 within the track record period. Three track record periods have been outlined in the accompanying consultation:

Track Record Period 1: 1st October 2010 – 31st May 2013

Track Record Period 2: 1st October 2011 – 31st May 2014

Track Record Period 3: 1st October 2012 – 31st May 2015

1.6.3. Data Included

The data used in the current analysis are complete up to 17th June 2016. Records were taken from the IFISH database, between 1st November 2010 and 31st May 2016 for ICES squares 36E5, 37E5 and 38E5 which encompass the Isle of Man king scallop fishery. In addition, data for Isle of Man vessels for the period October – November 2010 were obtained from DEFA paper logsheets as not all Isle of Man vessels have records on the IFISH database for that period.

Records included are outlined in Table 2.

Table 2. Data included in designation of proposed track record period for the Isle of Man king scallop fishery (2010, 2011, 2012, 2013, 2014 & 2015).

Season	From	To	Source	Resolved to
2010	01/10/2010	31/05/2011	IFISH/DEFA	36E5, 37E5 and 38E5
2011	01/10/2011	31/05/2012	IFISH	36E5, 37E5 and 38E5
2012	01/10/2012	31/05/2013	IFISH	36E5, 37E5 and 38E5
2013	01/10/2013	31/05/2014	IFISH	36E5, 37E5 and 38E5
2014	01/10/2014	31/05/2015	IFISH	36E5, 37E5 and 38E5
2015	01/10/2015	31/05/2016	IFISH	36E5, 37E5 and 38E5

2. Impact Assessment

2.1. Licence Cap

If licences were capped at the present level vessels that are currently involved in the fishery would not be impacted; however, future entrants to the fishery would not be permitted until such time as the scientific advice shows that the fishery could withstand additional effort.

2.2. Track Record Period 1

Of the 156 vessels that are currently licenced to fish for king scallops within the territorial sea, 94 reported landings of king scallops from ICES 36E5, 37E5 or 38E5 during Track Record Period 1, 84 have landing reports on 10 or more dates, 77 have landing reports on 20 or more dates, 75 have landing reports on 30 or more dates and 68 have landing reports on 50 or more dates (Figure 3). As the track record is not resolved to the territorial sea some landing records may have come from outside Manx waters.

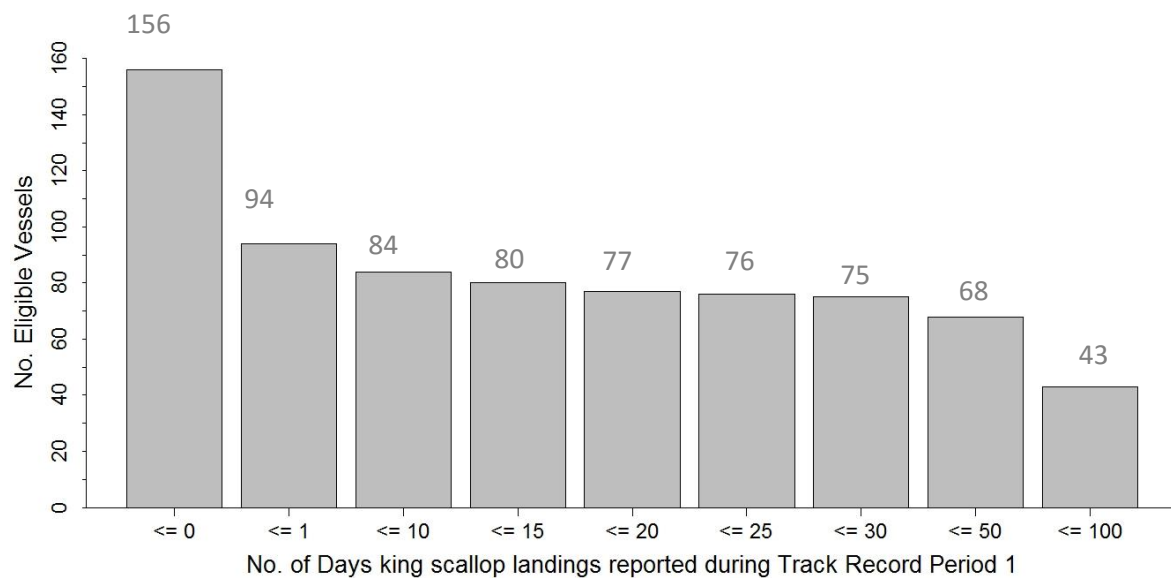


Figure 3. The impact on the number of eligible vessels resulting from increasing the required number of days fished for king scallops within proposed Track Record Period 1 (1st November 2010 – 31st May 2013). Scenarios ranging from no track record requirement (i.e. 0 days) to a requirement to have reported landings on 50 or more dates during the track record period as described in Question 2.2 are presented (n = 156).

2.3. Track Record Period 2

Of the 156 vessels that are currently licenced to fish for king scallops within the territorial sea, 105 reported landings of king scallops from ICES 36E5, 37E5 or 38E5 during Track Record Period 2, 97 have landing reports on 10 or more dates, 90 have landing reports on 20 or more dates, 80 have landing reports on 30 or more dates and 66 have landing reports on 50 or more dates (Figure 4). As the track

record is not resolved to the territorial sea some landing records may have come from outside Manx waters.

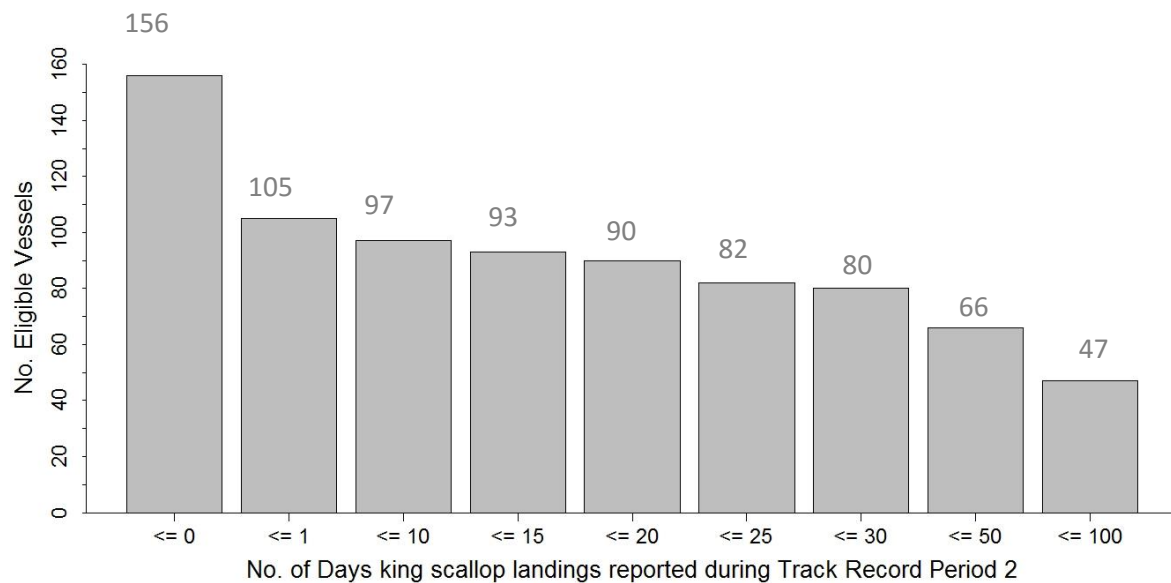


Figure 4. The impact on the number of eligible vessels resulting from increasing the required number of days fished for king scallops within proposed Track Record Period 2 (1st November 2011 – 31st May 2014). Scenarios ranging from no track record requirement (i.e. 0 days) to a requirement to have reported landings on 50 or more dates during the track record period as described in Question 2.2 are presented (n = 157).

2.4. Track Record Period 3

Of the 156 vessels that are currently licenced to fish for king scallops within the territorial sea, 119 reported landings of king scallops from ICES 36E5, 37E5 or 38E5 during Track Record Period 2, 109 have landing reports on 10 or more dates, 99 have landing reports on 20 or more dates, 94 have landing reports on 30 or more dates and 83 have landing reports on 50 or more dates (Figure 5). As the track record is not resolved to the territorial sea some landing records may have come from outside Manx waters.

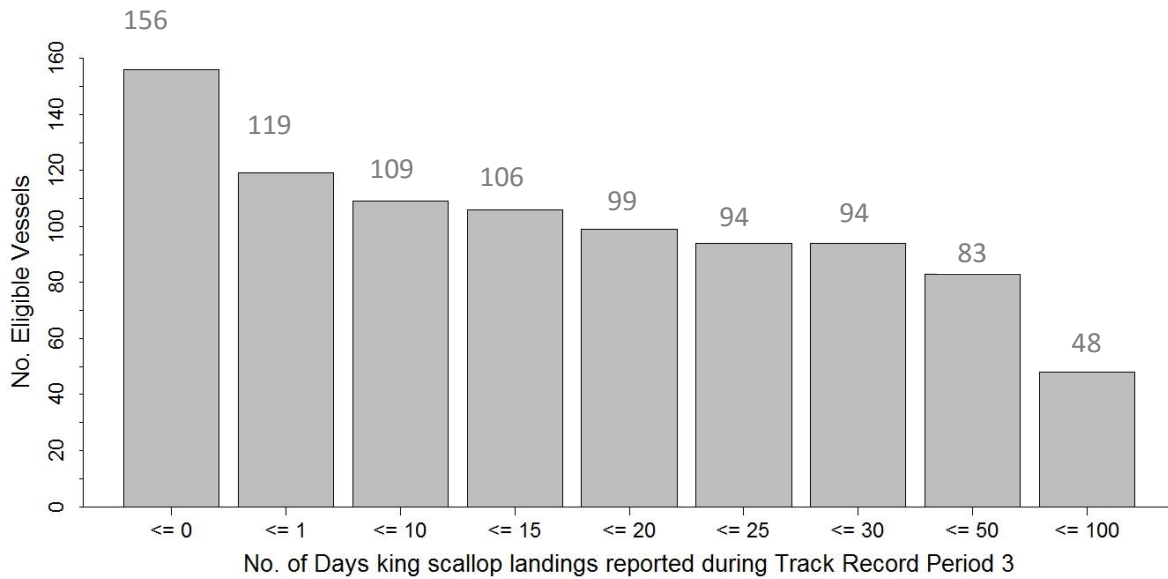


Figure 5. The impact on the number of eligible vessels resulting from increasing the required number of days fished for king scallops within proposed Track Record Period 3 (1st November 2012 – 31st May 2015). Scenarios ranging from no track record requirement (i.e. 0 days) to a requirement to have reported landings on 50 or more dates during the track record period as described in Question 2.2 are presented (n = 156).

2.5. Tow bar length

At present no information on tow bar length is recorded in fishers' logbooks or by officers boarding vessels. Fishers may remove dredges from tow bars to meet restrictions on dredge numbers. Thus larger vessels capable of towing more than 7 dredges per side, may fish within the Isle of Man's territorial sea, and vessels capable of towing more than 5 dredges per side may fish within the 0-3 nm zone. If the permissible tow bar length was reduced, then vessels would not be permitted to use or carry onboard within the territorial sea a tow bar of a length greater than that specified.

2.6. Weekend ban on fishing

There are currently no restrictions within the Isle of Man's king scallop fishery regarding which days vessels are permitted to fish. The accompanying consultation asks for views on a proposal to introduce new temporal measures in relation to fishing at the weekends. This measure could be implemented through either a complete weekend ban, which would restrict fishing on both days of the weekend (i.e. Saturday and Sunday), or a partial weekend ban, which would restrict fishing on only one of the two days (i.e. Saturday or Sunday).

An assessment of the landings data from the past six fishing seasons for king scallop from ICES Statistical Rectangle 37E5 indicates that on average around 27% of seasonal landings are taken on the weekend (Figure 6). Landings between these two days are fairly consistent with an average of 13% and 14% of seasonal landings taken on Saturday and Sunday respectively. This is roughly equivalent to a 1/7 proportion of seasonal landings and so a partial or full weekend ban would reduce the number of fishing days available by 1 or 2 days respectively and could lead to a reduction in seasonal landings

of around 27% (as indicated by king scallop landings data from ICES Rectangle 37E5), assuming LPUE remains at current levels.

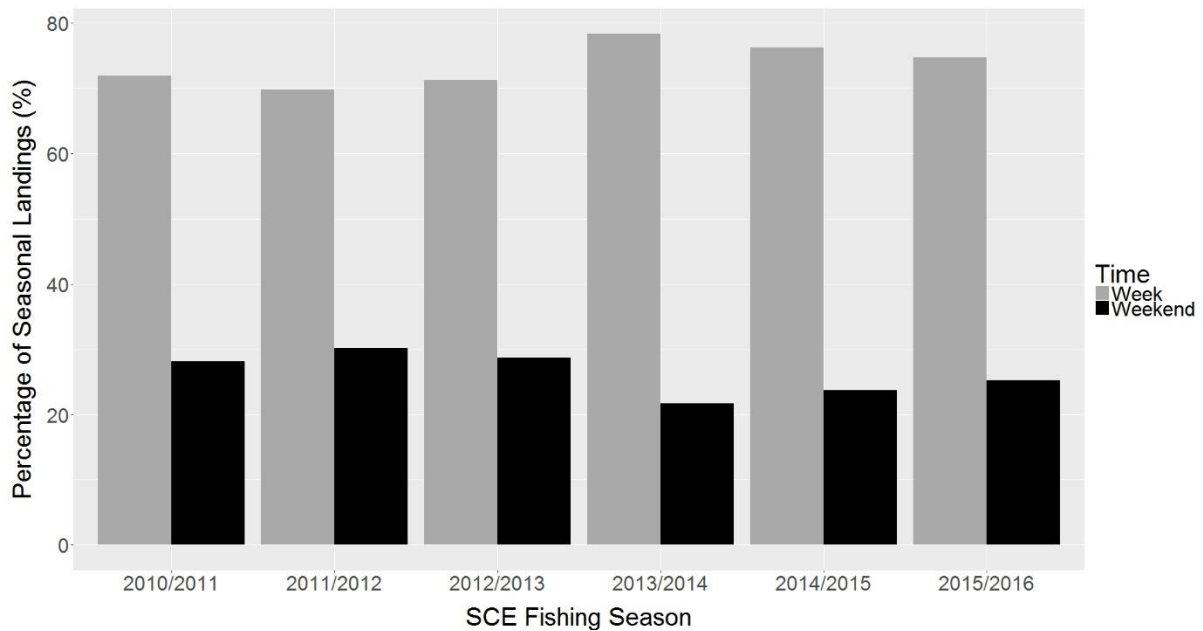


Figure 6: The percentage of king scallop landings from ICES Statistical rectangle 37E5 that are landed during the week (i.e. Monday to Friday – Solid grey bars) and during the weekend (i.e. Saturday and Sunday – Solid black bars). This includes data from all vessels fishing in ICES Statistical rectangle 37E5 and not only those vessels that are licenced to fish for king scallops within the Isle of Man’s territorial sea.

3. Conclusions

The number of unique vessels prosecuting the king scallop fishery within ICES Statistical Rectangle 37E5 has been increasing over the past six fishing seasons reaching a maximum of 132 vessels (including vessels that are licenced and unlicenced to fish for king scallops within the Isle of Man’s territorial sea) in the most recent fishing season (2015/2016). In addition, there has been a year on year increase in landings of king scallops from ICES Statistical Rectangle 37E5 from 2405 t in 2011/2012 to 2833 t in 2014/2015, however there was a decrease in landings in 2015/2016 to 2442 t. A corresponding year on year decrease in LPUE has also been observed from 2010/2011 to 2015/2016. This suggests that current effort levels are too high to sustainably maintain this fishery. The introduction of a track record period would reduce the number of vessels that are eligible to fish for king scallops within the Isle of Man’s territorial sea. During the 2010/2011 fishing season 64% of those vessels licenced to fish for king scallops within the Isle of Man territorial sea registered no landings for king scallops from 36E5, 37E5 or 38E5; during the 2015/2016 fishing season this percentage had reduced to only 22% following a substantial increase in licenced vessels prosecuting the fishery. The introduction of a weekend ban could also reduce the amount of effort within the Isle of Man’s king scallop fishery with an average of 27% of seasonal landings landed on a Saturday or Sunday during the previous six fishing seasons. Such measures would help to reduce the increasing effort that is evident within the fishery and try and promote sustainable management of this king scallop fishery.

4. References

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