

By: Lead Scientific & Conservation Officer

To: Kent and Essex Inshore Fisheries and Conservation Authority – 23 January 2017

Subject: **Whelk Research Update**

Classification Unrestricted

Summary:

This report provides Members with an analysis of whelk landings data, feedback from the industry, and an update of the future whelk research proposals. The report evaluates 2 potential management options that would address clear evidence of declining whelk stocks in the district

Recommendations:

It is recommended that Authority **AGREE** that the pot limit and number of tags issued is NOT increased and remains set at 300 for category 1 permits and 10 for category 2 permits.

The Authority **AGREE** to INCREASE the riddle gap size to 25mm, to INCREASE the number of escape holes to 10 and the size of escape holes to 25mm under the KEIFCA whelk fishery permit byelaw (Option 1)

The Authority **AGREE** to commit to developing a new technical measures byelaw that would allow the Authority to

- Open and close whelk harvesting areas for defined periods
- Require specific dimensions or set up in a whelk riddle used in the fishery
- The ability to set a district wide minimum size

Review of management

The first three year review of the Whelk Permit Byelaw technical requirements was due in early 2016. A KEFICA Technical Panel met in January 2016 to review the number of pots, number & size of escape holes and riddle gap size, and make recommendations on future whelk management measures to the full Authority at a meeting later that month.

Presentations from Cefas, a Bangor University PhD student, Eastern, Sussex and Kent & Essex IFCAs all highlighted that the current minimum landing size (MLS) of 45mm is below the size of sexual maturity for the overwhelming majority of whelks in the KEIFCA district (Table 1) and therefore does not ensure sustainability of the species. Using a 22mm riddle removes significant quantities of immature whelks from the fishery which Cefas regard as unsustainable.

Table 1: Size of maturity in different areas of the KEIFCA district

	Area 1		Area 2		Area 3		Area 4	
Sampling month	October		March		July		March	
Sex	Male	Female	Male	Female	Male	Female	Male	Female
Shell height at maturity	42.08mm	47.80mm	58.05mm	62.78mm	55.81mm	60.51mm	59.52mm	64.22mm

Eastern and Sussex IFCA's have recently introduced whelk legislation (Table 2)

Regulator	Management tool	Date Introduced	Key features
Kent and Essex IFCA	Whelk permit byelaw	2013 (emergency byelaw 2011)	<ul style="list-style-type: none"> • Pot limit (300 or 10 for recreational) • Min. 2 pot escape holes, diameter 22 mm • Riddle size of 22 mm • Pot tags and gear marking • Catch returns
Eastern IFCA	Whelk permit byelaw	2016? (emergency byelaw 2015)	<ul style="list-style-type: none"> • Pot limit (500 or 5 for recreational) • Min. 2 pot escape holes, diameter 24 mm • Riddle size of 24 mm • Minimum Landing Size (MLS) of 55 mm • Pot tags and gear marking • Catch returns
Sussex IFCA	Shellfish permit byelaw	2015	<ul style="list-style-type: none"> • Pot limit (300 inside 3 nm or 600 in the 3 -6 nm; 5 for recreational) • Min. 4 pot escape holes, diameter 25 mm • Riddle size of 25 mm • Gear marking
Jersey	Whelk Authorisation permit	2014	<ul style="list-style-type: none"> • Minimum landing size (MLS) of 50 mm • Riddle size of 22 mm • Pot limit depending on historical fishing inside 3 nm; 900 pot limit outside 3 nm • Limit of 40 vessels (outside 3 nm) • Limit of 30 kg whelks as by-catch
Normandy	Regional Whelk Fishing Licence Issued by CRPM-BN	Early 1980s	<ul style="list-style-type: none"> • Limit on number of Vessels in fishery (70 in 2015) • Vessel size limit of 12 m • Riddle size of 22 mm • Max of 3 crew with 240 pots each per day (max 720 pots/vessel/day) • Catch limit of 300kg per crew per day (max 900kg/vessel/day) • Fishery closed Weekends, bank holidays and all of January each year • Allowance of 3.5% undersize (random checks 1-2 times per month)
Isle of Man	Whelk fishing licence	2007	<ul style="list-style-type: none"> • Pot limit of 600 (total pots inside 3 nm limited to 3600) • Minimum Landing Size (MLS) 70 mm
Shetland Islands	Shellfish regulating order		<ul style="list-style-type: none"> • Pot limit of 600 • Minimum Landing Size (MLS) of 75 mm • Pot tags and gear marking

Table 2: comparison of whelk byelaw requirements in neighbouring IFCA districts

Taking all the information presented to them into account, the technical panel considered that current KEIFCA byelaw measures were leaving whelks stocks vulnerable to depletion by removing whelks that had not yet reproduced. The Panel’s recommendations to the Authority were that the maximum number of pots used should remain at 300, riddle bar spacing be increased to 25mm and the number of escape holes remain at a minimum of 2 but be increased in size to 25mm.

Industry concerns about these recommendations resulted in KEIFCA officers carrying out surveys in two ports (Leigh on Sea in Essex and Ramsgate in Kent) using three different sized riddles; 22mm, 24mm and 25mm. The combined results for the district were that an increase in riddle size would lead to catch reductions of approximately 21% using a 24mm riddle and 37% using a 25mm riddle.

At the January 2016 Authority meeting three options were discussed but members did not reach a decision and therefore the previous management rolled over until this year (2017/2018).

Review of landings data

The long term picture of MMO landings data (recording landings in KEIFCA district ports, from vessels fishing inside and outside our district) shows continued and relatively consistent high levels of landings compared to landings prior to 2010 (Fig. 1).

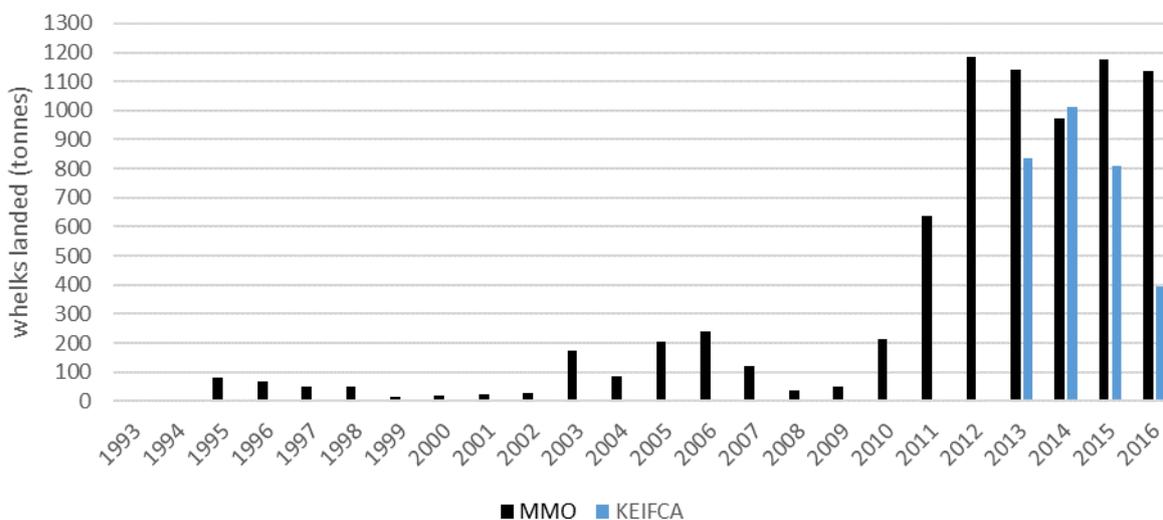


Fig. 1, MMO whelk landings data for KEIFCA district 1993-2016 with KEIFCA’s landings data shown for 2013-2016

However, analysis of KEIFCA whelk permit data landings show whelk landings within the district are reducing year-on-year, and are following a worrying downward trend when compared to the high of 2014. Although the number of permits has remained relatively similar over the last three years in the mid to

low thirties, the volume of landings as well as the numbers of pots set shows the same downward trend (Fig. 2)

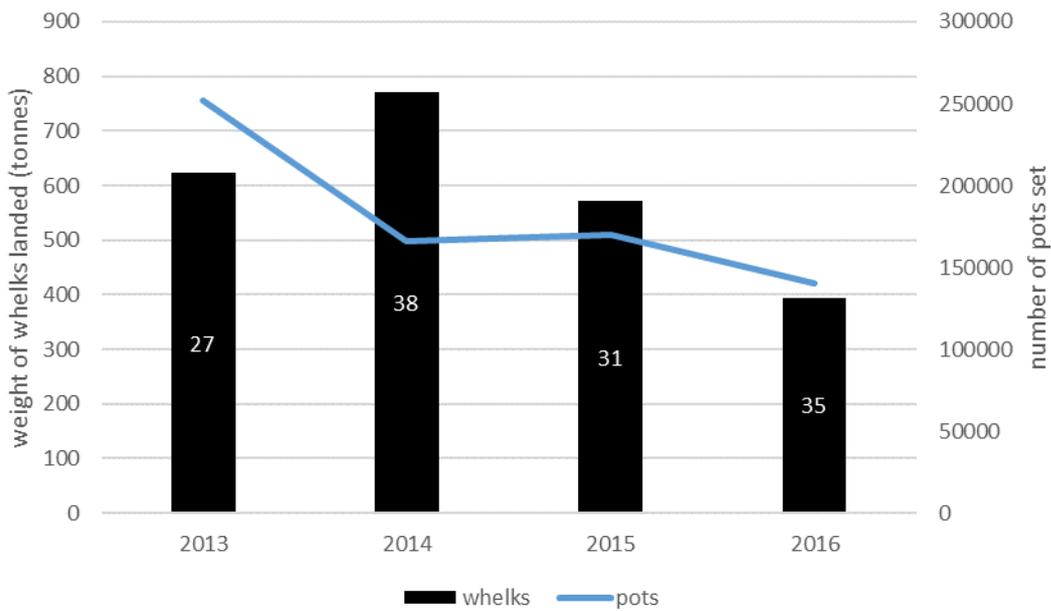


Fig.2 Total weight (tonnes) of whelks landed and the total number of pots set during the period April-November in each year from 2013-2016. The white number inside each black bar represents the number of permits issued for that year.

Analysis of monthly KEIFCA landings data (Fig. 3) unfortunately also shows that in general landings have reduced month on month from previous years and in most months the 2016/17 year is the lowest recorded so far (with the exception of April and October).

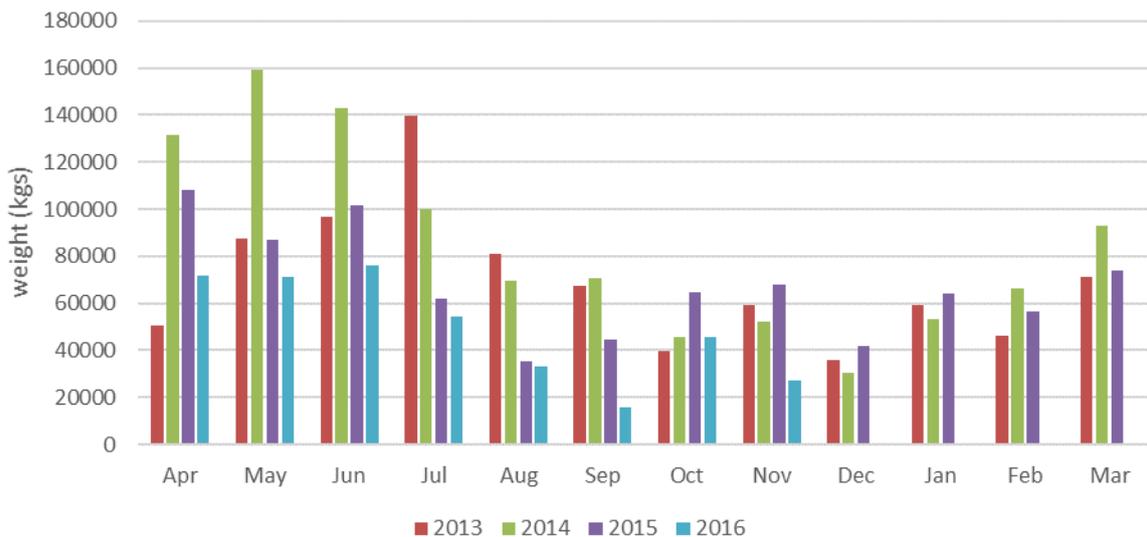


Fig. 3 Total weight (kg) of whelks landed each month 2013-2016

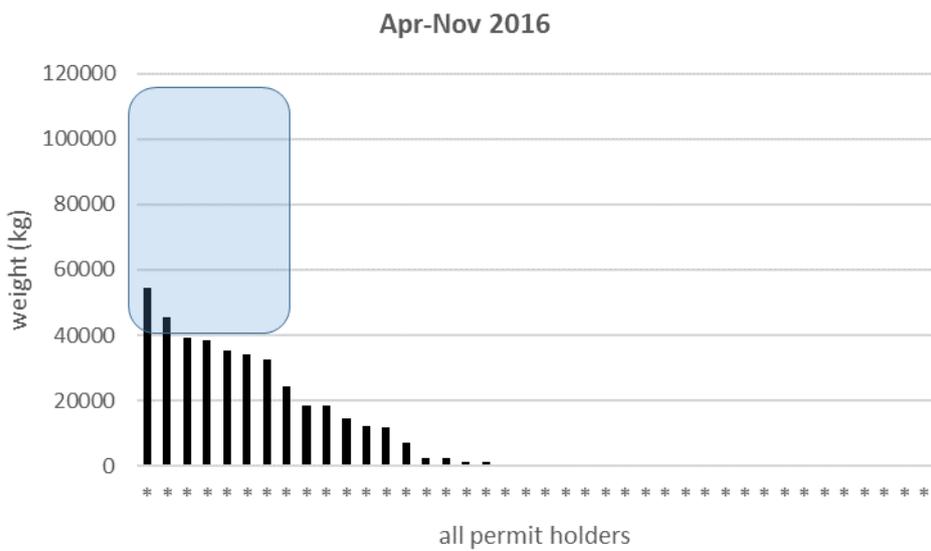
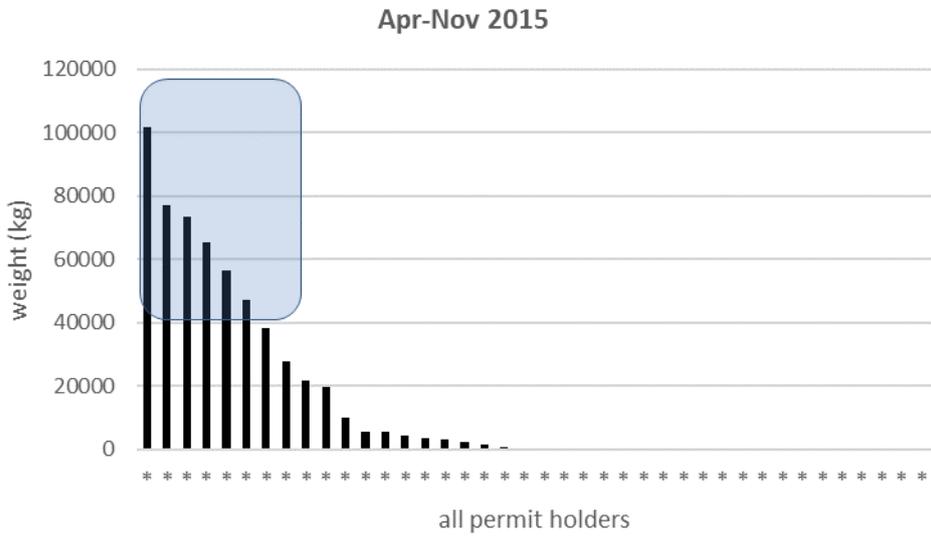
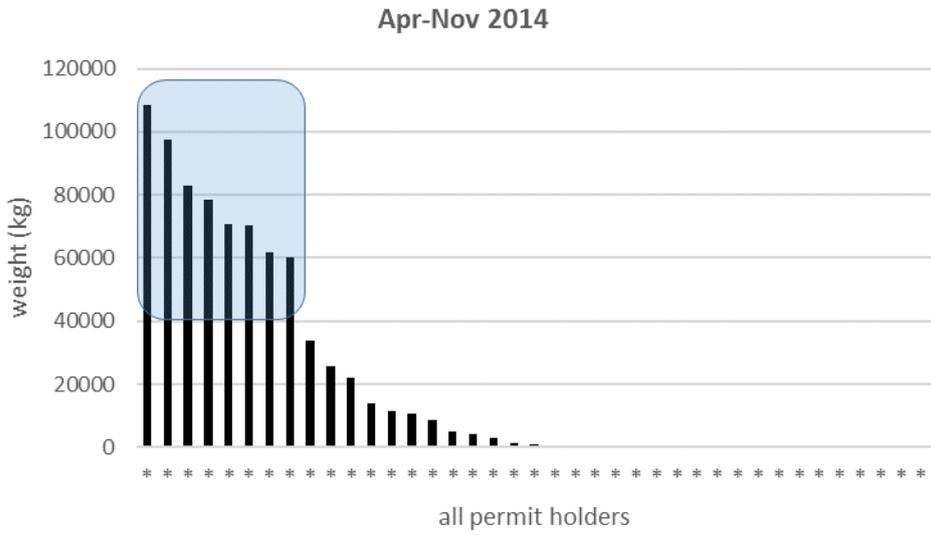


Fig.4 Total weight (kg) of whelks landed by all permit holders during April-November 2014 -16.

A more detailed analysis of individual permit holders' landings (Fig. 4) over the same year on year time period shows that whilst the numbers of active permits have remained relatively constant there has been a significant (half to a third) in reduction landings of the most active 8 vessels. As the square in the charts also highlights, these more active vessels are still working in the district and the less active/ part-time vessels have remained relatively consistent.

The decrease in landings and fishing effort but the maintaining of the catch per unit effort (Fig. 5), combined with the large increase in landings from outside the district suggest that in general fishermen are moving further afield from their previous fishing grounds and moving outside the KEIFCA district to fish. Discussions with the industry support this conclusion and suggest that reduced numbers of whelks above the 45mm minimum landings size (MLS) within the district have forced more permit holders to fish outside the 6nm limit this year. In summary, analysis of landings data suggests that management measures are required to address this stock decline in order to ensure a future sustainable fishery.

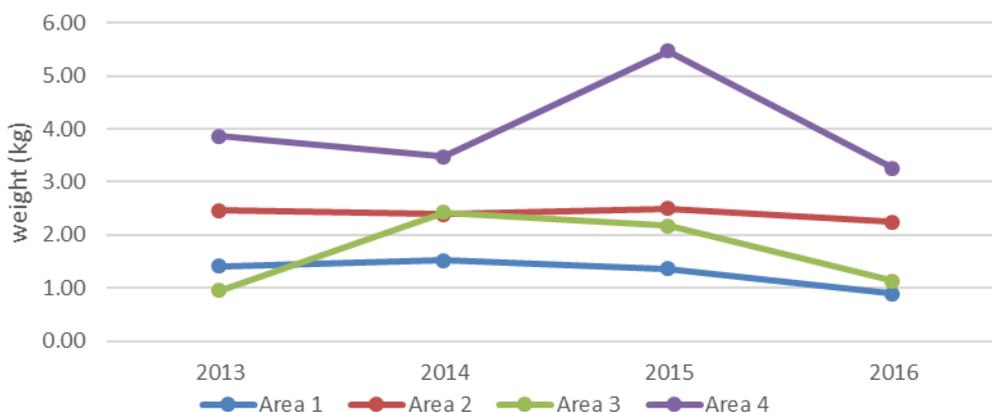


Fig.5 Annual mean weight (kg) of whelks per pot in each of the 4 KEIFCA whelk fishing areas 2013-2016

Analysis of Latent Capacity

The issue of latent capacity, i.e. permit holders not fishing for the greatest number of days that is practically possible nor using the maximum permitted number of pots, was highlighted at the January 2016 Technical Panel meeting and reiterated at the subsequent Authority Meeting. Analysis of the monthly catch return data reveals that latent capacity remains at high levels for both elements of the fishery. The most days fished by a 2016 permit holder is 94; assuming that all permit holders could have fished for this number of days there is 74% latent capacity, as shown in Fig. 6. As in previous years approximately one third of the permits issued in 2016 have not been used at all. Out of the 21 permit holders that have fished, there is still 56% latent capacity.

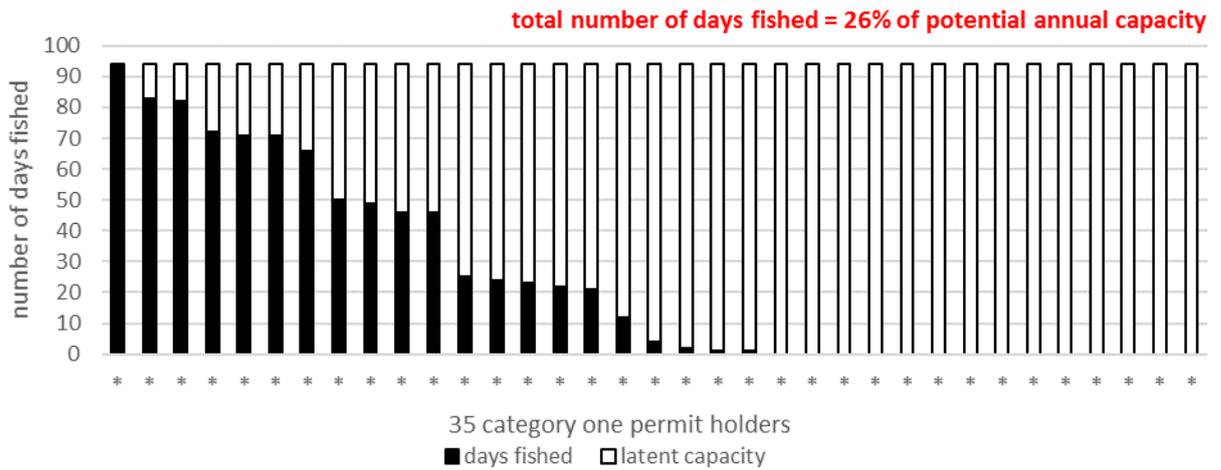


Fig.6 Total number of days fished in 2016 by all KEIFCA whelk permit holders

Similarly, the total number of pots set is far less than it potentially could be. The byelaw allows for 300 pots to be set by each permit holder for each fishing trip. Taking the maximum number of days fished as 94 (as detailed above) and multiplying this by 300 gives the potential maximum number of pots that each permit holder could set in 2016 (Fig.7). For this element of the fishery the latent capacity is even greater at 86%. As with the number of days fished, if we consider just the 21 permit holders who have set pots this year the latent capacity decreases to 76%.

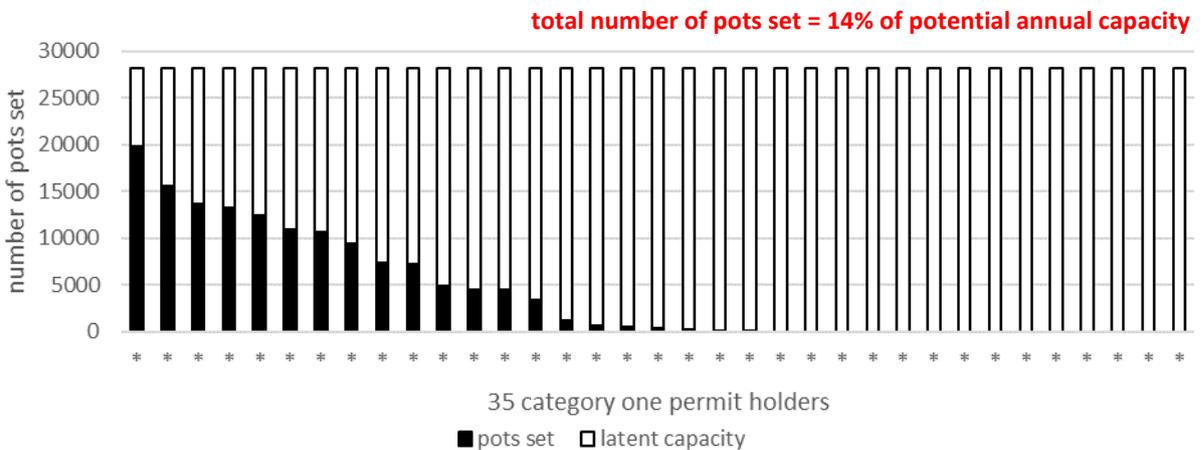
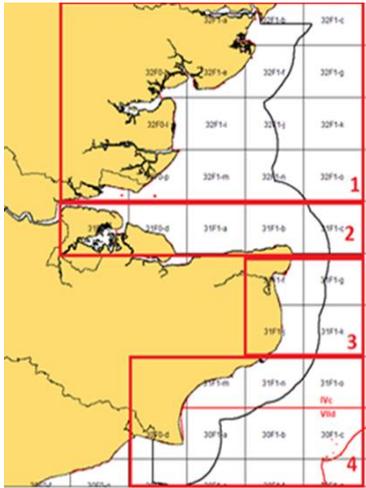


Fig. 7 Total number of pots set in 2016 by the 35 whelk permit holders

KEIFCA Landings Data per fishing area



Historically whelk fishing activity within the district has been subject to both seasonal and spatial variability; area 2 being fished predominately in the winter, area 4 being fished mainly in the summer and little activity occurring in areas 1 and 3. However, in 2014 and 2015 fishing in Area 2 increased during the period March-June, Area 3 started to become fished regularly and fishing occurred in Area 1. As can be seen from figure 8 below, during 2016 landings have reduced across the whole district with negligible activity recorded in Area 1, very little in Area 3 and Area 2 has remained the most heavily fished.

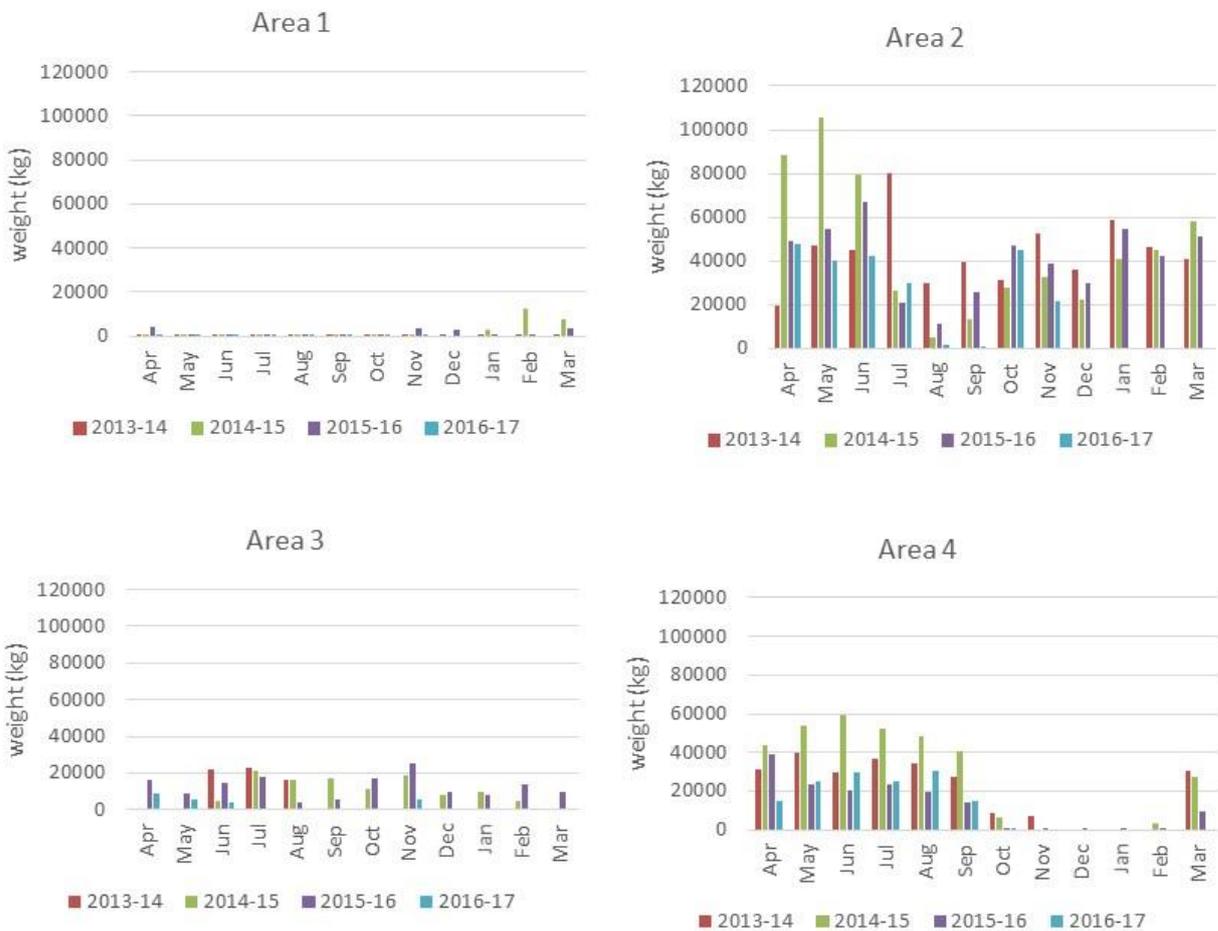


Fig.8 Total weight (kg) of whelks landed in the 4 KEIFCA areas from 2013-2016

Continued analysis of the monthly catch return data, submitted by permit holders as a condition of the whelk permit byelaw, reveals that although the total quantity of whelks landed in each area has reduced since 2014-15 the weight of whelks per pot, or catch per unit of effort (CPUE), has altered very little over the past four years in all areas, with the exception of an increase in area 4 in 2015 (figure C).

Working with the local industry

Feedback from the industry on proposed management

A brief tick box based questionnaire is sent to all permit holders in December each year and the responses are evaluated. Fewer responses were received this year than in any previous year. For the past three years the response rate has been between 33% and 39% but this year just 20% of permit holders responded. A summary of the results is given in Appendix A.

The responses from the questionnaires generally support the landings analysis above and suggest that fishing has generally been poorer this year than last and there are several reflections on the increased fishing pressure on the stocks. The replies painted a lot less positive picture of the future than in previous years, however there seemed to be a lot of agreement that numbers of small whelks were holding up. There was also calls for more whelk enforcement.

Whelk biology research

As proposed at the January 2016 Authority Meeting, KEIFCA hope to work with industry on an EMFF funded two year research project to analyse seasonal and spatial variability of the whelk stocks in our district. In October 2016 all 35 Category One permit holders were sent a written invitation to tender for the project which would require a fisherman from the North Kent coast (area 2) and the South Kent coast (area 4) setting 5 additional pots each month. The contents of the pots would be collected by KEIFCA for analysis and each participant would be paid £75 per month for the duration of the project. Disappointingly only one permit holder responded. As a result of the lack of support/interest from industry to work with KEIFCA, a more limited research plan has been written for sampling to take place off of the North Kent coast only and the EMFF funding application has been reduced accordingly.

Whelk grading machine trials

Currently there is a requirement under the KEIFCA whelk permit byelaw and associated technical specifications to size grade whelks by passing them through a 22 mm riddle. There is no standard method for riddling of whelks on board commercial vessels with many fishermen using different sized riddles (with the same 22 mm slots in them) and many riddling by hand. Constant feedback from the industry as well as from KEIFCA officers enforcing whelk regulations is that a more efficient sorting mechanism would be of great advantage to everyone working in the fishery.

Members of the industry have been looking at developing such a machine with the help of KEIFCA. Plans have been drawn up making such a machine based on a design of this riddle resembling the type of riddle currently used on the Thames Estuary cockle vessels whereby the whelks pass through a rotating chamber with the required bar spacing.

Since the last meeting and the Authority agreeing to spend research reserves in developing this idea another method of sorting whelks has come to light (Appendix B). A whelk size-sorting system has already been developed by the Canadians which has been trailed and tested. The system uses a flat vibrating plate rather than a rotating cylinder and is set up to work on 45' vessels. Since December 2016 we have contacted the relevant people and have been trying to get more information and feedback as to this system. Members of the local industry that we have talked to like the idea but would like to find out more and

see it in action (get a video). We are continuing our dialog with our Canadian contacts.

As there is the possibility of using a system already tested we have held off investing in a new design and are looking to hold a meeting with members of the industry to review designs and options in the near future. At this point we can review the options available to develop an EMFF grant application for this project and its role out.

Enforcement of the whelk fishery

A large scale targeted operation has been underway since early December with inspections both at sea and on land being carried out on a regular basis. Five offences of landing undersized whelks were reported by officers as well as one offence of fishing without a permit. These offences are currently being investigated by officers.

The need for new management

The evidence presented to the Authority last year demonstrates that whelks reach sexual maturity in the KEIFCA district above 45mm (Table 1). A consequence of this research is that the current EU Minimum Landing Size (MLS) of 45mm does not allow whelks to reproduce before they are fished, as it is smaller than the mean size of maturity for the important whelk fishing grounds in our district. Significant enforcement of the whelk fishery also shows that fishermen using the current 22mm riddle (endorsed by the KEIFCA byelaw) are illegally landing volumes of undersized whelks (<45mm).

All these factors combined with the significant reduction of year on year whelk landings suggest that significant action needs to be taken to protect the whelk breeding population needs to be taken immediately by the Authority to ensure that the fishery remains viable in the long-term.

To ensure the sustainable exploitation of whelk stocks it is critical to increase the size of whelks being removed from the fishery. This could be achieved by introducing a MLS greater than the current EU MLS of 45mm, as Eastern IFCA have done. Alternatively, the space between the riddle bars could be increased thereby returning a greater number of immature whelks to sea. At present we do not have the ability in our byelaws to increase the minimum landing size but we do have the ability of increasing the riddle bar spacing.

Proposed management options

Based on the scientific evidence and information currently available all the evidence suggests that significant additional management measures are required this year and that the window for a phased approach has diminished. It is proposed that by the end of the next two years the technical measures of the existing whelk permit byelaw shall be changed to:

- pot numbers – remain at a maximum of 300
- escape holes – increase minimum number to 10 and increase size to 25mm
- riddle spacing – increase to 25mm

There are 2 options for implementation either an immediate increase or a phased approach over the next 2 years:

Option 1

Year 1 – 25mm riddle, 10 x 25mm escape holes

Option 2

Year 1 (2017/18) – 24mm riddle, 10 x 24mm escape holes

Year 2 (2018/19) – 25mm riddle, 10 x 25mm escape holes

In addition to the measures identified under the current byelaw, discussions with industry and with other stakeholders have highlighted the requirement for the Authority to have more tools available to it to manage this fishery.

It is proposed that the Authority commit to developing a new technical measures byelaw that would allow the Authority to

- Open and close whelk harvesting areas for defined periods
- Require specific dimensions or set up in a whelk riddle used in the fishery
- The ability to set a district wide minimum size

Evaluation and impacts of the option

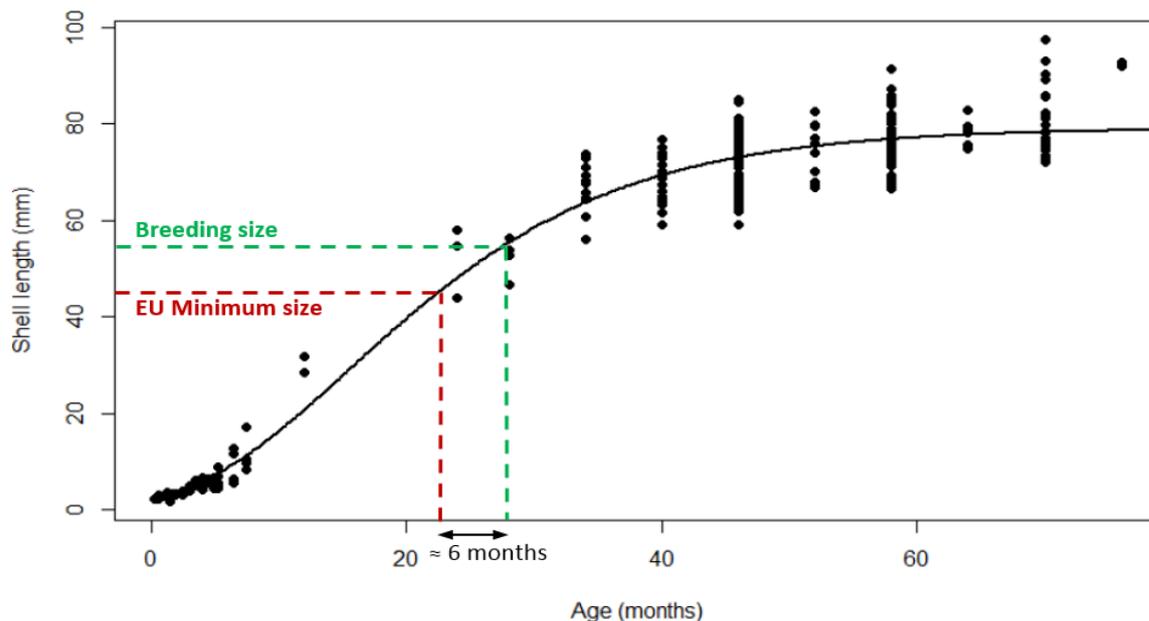
Pot numbers

Currently the number of pots allowed under the permit is 300 per commercial vessels and 10 per hobby vessel. Although there is an argument to reduce the total number of pots allowed under the permit, full time commercial fishermen have continually reported back to the Authority that 300 pots are a critical lower limit. Whereas increasing the riddle size would have a constant impact over all permit holders and business models decreasing pots would have proportionally more impact on the full time whelk fishermen.

Increasing riddle gap size

Investigations from last year showed an increase in riddle size change from a 22mm riddle to a 24mm or 25mm riddle would mean that more whelks would be returned to the sea (24mm riddle 21%, 25mm riddle 37%). An increase in the gap size of riddles would therefore have a direct impact on the earnings of the permit holders, however this impact is very variable and depends on the area they fish in.

Although there would be a significant short term impact on permit holders' landings the management could in effect be reducing some landings by 20-40%. New research suggests it takes months rather than years for a whelk to grow the additional 8-10mm that would mean it would now be landed by the 25mm riddle. The research studying the shell lengths of whelks (Fig. 9) at different ages suggests that it takes in the region of five to seven months for a whelk to grow from 45mm to 56mm.



Fig,9 Whelk growth curve illustrating the relationship between shell length and age. The age was determined from the analysis of statolith growth rings in whelks collected within the first six months. A Gompertz growth curve has been fitted to the data. The red intersect line highlights the current EU minimum size and the green line highlights the mean size of maturity for KEIFCA district.

Another way of looking at the potential impact of the management measures in reducing landings by 20%-40% for five to seven months is that the overall impact would be equivalent to returning the fishery back to the landing quantities of 2013, before the rapid expansion of the whelk fishery.

Number and size of escape holes

The use of escape holes has been a long running industry intuitive and is supported by IFCA and CEFAS research. The effectiveness of escape holes will depend on a number of factors like soak time and amount of bait used, however effective escape holes can help as an initial form of sorting the catch and could reduce the problems incurred with the inefficiency of riddles in sorting whelks.

In discussions with the industry the use of escape holes is generally well received however there is a time cost associated with drilling holes in 300 pots. There are a variety of different sized pots and designs used in the district and concerns have been raised by the industry as to the ability of some designs to maintain their structural integrity with too many large escape holes. There is a general feeling that more than 10 escape holes would pose significant problems to some fishermen. On inspection, fishery officers have agreed with this conclusion.

Feedback from the industry on proposed management

The industry was asked to comment on increasing the riddle size to 24mm with 10 x 24mm holes and on increasing the riddle size to 25mm with 10 x 25mm holes (Appendix A). Out of 35 permit holders contacted seven replied, with the overwhelming response being to increase to the 24mm option rather than the 25mm option but in general the preference was not to increase the riddle size from the current 22mm. Although asked, there was very little feedback on any economic impacts of either of the size increase put forward.

Fifty percent of replies indicated that they thought the number of pots should remain at 300 with 25% indicating a reduction and 25% suggesting an increase. The general feedback on this issue is best summed up by one reply that said “in order to earn a reasonable living 300 pots seems fair, certainly no more”.

Evaluation of the different options

In deciding between management Option 1 and 2 there are a number of different factors to weigh up. Option 1 would have a more significant impact immediately and would respond quickly, as an emergency measure, to the current landings analysis that suggests that the whelk population, especially the amount of sizable whelks is decreasing significantly year on year. From a stock management perspective Option 1 would be best at stabilising the population and hopefully avoiding a stock crash. Option 2 would have a more gradual impact on the whelk population and as such would spread out the financial impact of increasing the riddle size on the industry. Unfortunately, a more gradual response runs an increased risk of a stock crash. Both options would also incur costs to the industry in potentially constructing new riddles (costs could vary considerably but £400 is a fair estimate) and in drilling more holes in pots (2 days’ work- £300 to £500). Under Option 2 fishermen would incur these costs twice compared to Option 1.

The economic impact of taking action also needs to be weighed against the shadow impact of not taking action (Fig. 10). By constantly removing large numbers of whelks before they have breed there is a high likelihood that the breeding population is shrinking and could soon reach a tipping point where the population crashes. Research suggests that it takes between two to three years for a whelk to reach a size where it starts to reproduce, however this is dependent on a viable breeding population and there have been a lot of anecdotal reports from fishermen that numbers of larger whelks have reduced significantly. Unfortunately, the current situation suggests that with limited population of adult breeding whelks it could take two generations to rebuild the populations. In effect this could mean that the effects of such a crash could last for four to six years.

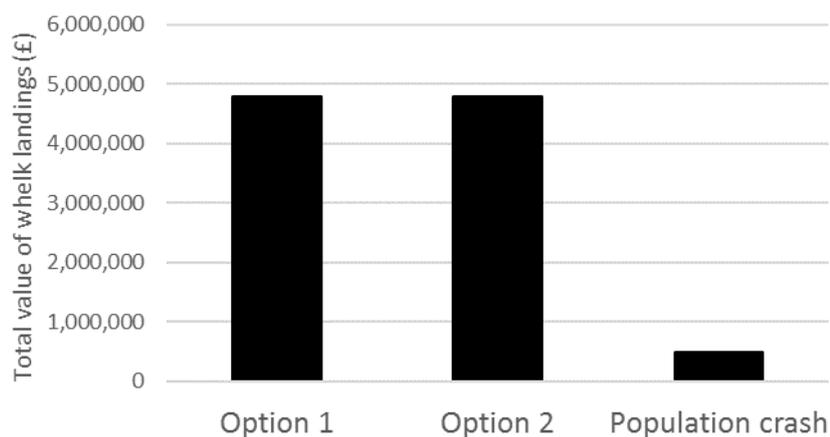


Fig.10. An estimated potential 5-year projection of whelk landing values for different management options, including the cost of management changes to permit holders. The projections are based on an estimated annual district landings of £1M (this is a very rough estimate but is useful to illustrate the potential impacts of different options). Option 1 includes initial costs of buying new riddles and drilling new holes as well as an estimated 37% reduction in landings for 6 months. Option 2 includes costs of buying new riddles and drilling holes in year 1 and year 2. Option 2 includes an estimated reduction in landings of 21% in year 1 and 16% in year 2. The population crash scenario is based on the fishery being limited to a very small part time fishery with a pot allocation of <50, no full-time fishermen and a 90% reduction in landings.

Currently the whelk fishery supports about 14 boats and brings in about £1M+ to the local economy. Whilst a short term reduction in catch would be significant, a population crash would be catastrophic, not only to local fishermen but also local whelk wholesalers and fish stalls supplying the holiday markets.

Developing additional management tools

In discussions regarding appropriate management measures for the whelk fishery there was reflection that a suite of additional management tools might give more options and flexibility to the Authority to help achieve the correct balance of measures to achieve a sustainable fishery. Although long term whelk fishery management will be underpinned by analysis of the catch return data and the results of additional research (section **), it is unlikely that the industry would adopt voluntary measures and so developing a new additional whelk technical measures byelaw would be the best way of implementing these tools.

Measures such as opening and closing areas for specific time periods (e.g. protecting the spawning season) and the ability to set a minimum landing size that is relative to the KEIFCA district, would give the Authority additional tools to react to changes in the fishery. Additional measures could also build on the intended work in developing more efficient whelk grading machines and could require key dimensions to be met (more detail on the construction of riddles).

Developing a new byelaw would require a resource commitment and there would be other byelaws (native oyster permit byelaw and a vessel length byelaw) that the Authority have already committed to developing. However, as a significant component of the byelaw would be based on research undertaken over the next year, detailed development of the byelaw would only really happen after this. Agreeing to the principle and priority of developing a new byelaw would help officers develop a pathway for delivery and start the initial engagement process.

Recommendations:

It is recommended that Authority **AGREE** that the pot limit and number of tags issued is NOT increased and remains set at 300 for category 1 permits and 10 for category 2 permits.

The Authority **AGREE** to INCREASE the riddle gap size to 25mm and to INCREASE the number of escape holes to 10 and the size of escape holes to 25mm under the KEIFCA whelk fishery permit byelaw (Option 1)

The Authority **AGREE** to commit to developing a new technical measures byelaw that would allow the Authority to:

- Open and close whelk harvesting areas for defined periods
- Require specific dimensions or set up in a whelk riddle used in the fishery
- The ability to set a district wide minimum size