

## **Report on the review of 140mm to 150mm Increase in Female Edible Crab Size**

The Potting Permit Byelaw was introduced on 17<sup>th</sup> March 2015. Formal consultation through the development and submission of this byelaw had taken place following Defra guidelines including meetings in North, South and East Devon with local crab fishermen. After the Byelaw was brought in a few of the fishermen from East Devon and Plymouth contacted the IFCA to complain that they had not been aware of the consultation on the Byelaw and in particular the proposal to increase the size of female edible crab. The fishermen highlighted their concerns with the increase in the minimum size for female brown crab from 140mm to 150mm under permit condition 1.2(i) of the Potting Permit Byelaw claiming that it would lead to a reduction of up to 70% in their catches of female edible crab. The IFCA decided to undertake a ten week consultation from 22<sup>nd</sup> June 2015 to canvass opinion on the increase from commercial Potting Permit holders. During the same period Officers undertook on-board surveys on fishing vessels to ascertain the level of impact the increase in size was having on the boats' landings. Scientific information was also sought regarding the effect of an increase on the crab stocks. The following report summarises the results.

### **Consultation Responses**

The ten week consultation period ended on 1<sup>st</sup> September 2015. The consultation document was sent out to all 143 commercial Potting Permit Holders. In total fifteen responses were received. Fourteen of these responses were received inside the deadline and one was received on 2<sup>nd</sup> September 2015. The later response was the one most vociferous in objecting to the increase. Fourteen of the respondents hold D&S IFCA potting permits which equates to a 10% response from the consultation. One of the responses was received from a processor who does not hold a permit. Annex 1 gives the actual response from the fishers who completed the consultation questionnaire.

In summary there were eleven permit holders who were supportive of the increase, one of which felt that it could have been brought in as 5mm increments over two years rather than straight away, and three that opposed it. It is an important point to note, that of the eleven permit holders who supported it three suggested that this increase would affect their businesses to a degree but still supported the increase.

### **Cefas Scientific Advice**

The D&S IFCA sought information from Dr Ewen Bell, Senior Inshore Fisheries Advisor at Cefas (Centre for the Environment, Fisheries and Aquaculture Science) on brown crab growth, recruitment, spawning and stocks.

Annex 2 provides details of all the biological parameters of brown crab provided by Dr Ewen Bell. The salient points from the data are:

- When male and female brown crabs reach 140-150mm carapace width they increase their size by 25% per moult. When female crabs moult (break out of old shell) they are receptive to mating before the new shell hardens. Whilst there is limited information on brown crab moult frequency, growth models have shown that animals are likely to have slowed to moulting every two years by the time they reach 140mm.
- As crabs get larger their reproductive output increases faster than their size i.e. big crabs output more eggs per kg than small crabs.
- According to egg production models that Cefas use a 150mm crab should output 11% more eggs despite only being 7% larger than a 140mm crab.

- For the same amount of fishing pressure (e.g. fishing mortality =1) there is 20% more spawning potential with a 150mm size crab than with a 140mm crab.
- At high fishing rates (fishing mortality =1) most animals in a population will get to spawn three times or less.
- At 150mm Minimum Conservation Reference Size (MCRS) with a high level of fishing mortality 30% of animals will have 3 spawning events.
- At 140mm MCRS with a high level of fishing mortality 26% of animals will have 3 spawning events.
- At little or no fishing mortality the MCRS makes no difference to the percentage of animals that will have 3 spawning events.
- By the time a female crab reaches 150mm it is likely to have spawned on average 2.9 times. At 140mm this is reduced to 2.4 times. Therefore if the MCRS is 150mm for female crabs there would be an extra 0.5 spawns per animal which equates to a 20% increase in spawning events if it is left to reach this size.

It is important to note that it is not necessarily the case that managing a stock to ensure that everything can spawn once will achieve sustainability of the stock. L50 (the size at which 50% of the population can spawn once) is simply used as a convenient point of comparison between species. In order to understand what level of protection the minimum size offers to the stock an exploration of what happens to the stock under a range of fishing mortalities is needed(see figure 1).

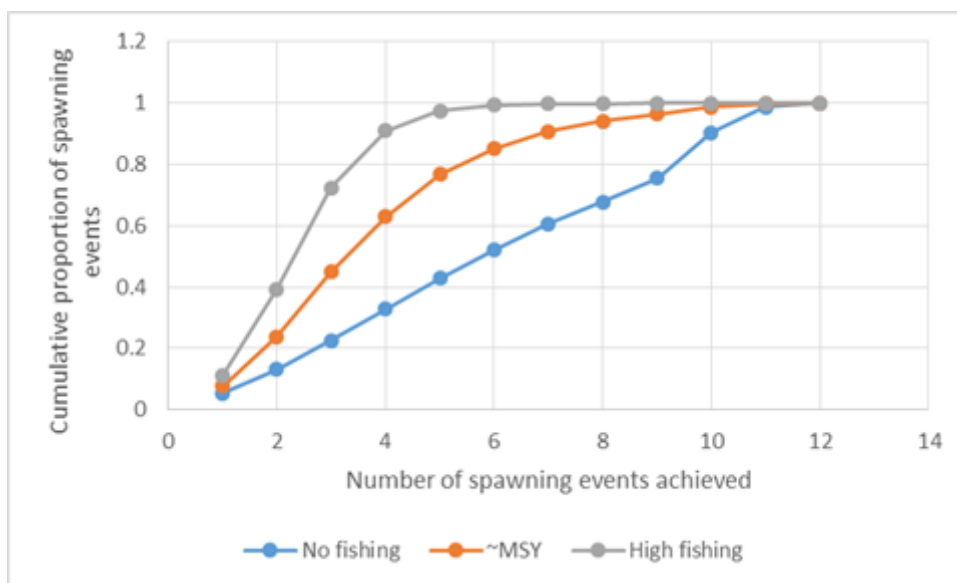


Figure 1: Spawning events achieved at different fishing pressures.

Due to different growth and maturation rates, animals of the same age may experience a range of spawning opportunities. The numbers of animals achieving 1 or 2 spawning opportunities didn't change much even with a large variation in fishing mortality. A response to variations in fishing mortality occurs at three or more spawning opportunities. High fishing mortality dramatically reduces the number of spawning events achieved.

Using the model with the minimum size set at 110mm (i.e. around L50). When there is no fishing there is a lot of repeat spawning activity with over 50% of spawning events coming from animals that spawn 4 or more times. At high fishing rates the vast majority of animals get to spawn three or less times.

Dr Bell was asked whether an increase in MCRS would benefit the stock. His response was “it would be a good safeguard to the stock if there are no other controls in place over the level of fishing effort. It adds more security to the stock and is more likely to achieve MSY. For the same amount of fishing pressure an increase in MCRS would mean that there are more animals in the water which would safeguard more spawning. At 150mm MCRS there would be an increase in spawning potential of 20% over what there would be with a 140mm MCRS.” Dr Bell uses a hypothetical model using stock data which gives an indication of what might be expected to happen.

### **Evidence from Lyme Bay Experimental Potting Project by Adam Rees**

Adam Rees, PhD student at Plymouth University, produced a report for D&S IFCA summarising his potting project in Lyme Bay and how the evidence he has collected over the past three years may inform the effects of the increased MCRS for hen brown crab on the catch and landings. His full report can be seen in Annex 3. Data from the ports of Axmouth and Beer across multiple years was used for comparison. A total of 2023 brown crab were used from 6 sampling seasons of which 1642 were females and 1281 were males. 9% of the total female catch, across all size classes, falls between 141-149mm. The new increase in MCRS will result in a reduction of 12% of overall marketable catch of the female brown crab (i.e. 12% of hen crab catch over 140mm), and 10% of overall marketable catch including males, for Lyme Bay fisheries that fall under Devon and Severn IFCA jurisdiction. It should be highlighted that this data is collected from experimental areas used for the project, which experience a range of potting densities, including some areas that experience no potting effort. The severe winter storms of 2013/2014 may also have had an impact on brown crab and this may have had an influence the data collected in periods post storm.

### **Data Collection on board fishing vessels**

Five on board surveys of crab catches took place between 21<sup>st</sup> May and 10<sup>th</sup> July 2015. Officers of D&S IFCA’s Environment team contacted all the fishing vessel owners/skippers who hold Potting Permits from Axmouth and Plymouth to organise trips on board to look at the level of impact of the increased MCRS and concerns raised by the fishermen in these ports. Eleven Axmouth fishermen were contacted and asked if they were happy to have IFCA officers on-board to undertake the survey work – measuring and sexing a proportion of the day’s catch. Of these two vessels were in refit; two did not reply to messages left; three were not potting either because catches were generally down or were undertaking other fishing activities such as netting or angling; three said they were happy to have an officer aboard but two of these were fishing very intermittently or in the Southern IFCA district most of the time. The weather also played a big role as the vessels were not going to sea as often. One boat refused to have an officer aboard after initially agreeing to support survey work. This skipper sent in a consultation response objecting to the increase. A survey was carried out on one vessel and the results are shown in Annex 4. This skipper also responded to the consultation but was supportive of the increase.

Plymouth boats were also invited to undertake on-board surveys. One survey was undertaken on board the vessel of one of the skippers concerned about the increase. After this survey the skipper refused to have officers aboard on future surveys to carry out further measuring of catches. Nine other Potting Permit holders working out of Plymouth were contacted. Unfortunately three said their boats were too small to have an officer on board; two were fishing for spider crabs and lobsters and not brown crab; one was rod and lining

and not potting; two did not respond to messages left; and the other refused to have officers aboard.

Other vessels were then contacted to undertake this survey work. Result from the survey work are shown in Annex 4 The two from Salcombe fish very close to the Plymouth boats which is why they were selected to get a better picture of the sizes of crabs caught in this area. The catches of the vessel from Ilfracombe show a large proportion of crabs over 140mm carapace width. However the fishermen selected out many of these and only landed females over 160mm as he felt the smaller crab was not suitable for his market.

## **Summary**

The consultation and the other data gathering exercises have been the first time that the review process for permit conditions has been undertaken. Communication with commercial potters has been straight forward to achieve through the permit system and the officers have not received any feedback to suggest that any of the commercial potters were not aware of the review.

The Plymouth University report, the surveys at sea data, and the feedback from potters indicate that there has been, at least temporarily, a significant potential reduction in the volume of female edible crab taken as a result of the size increase. The reported potential reduction is in the range of 10% to 40% across the fleets of North and South Devon. However the actual reduction in female crab landed is likely to be less. Many fishermen reported to have been landing female crab above 150mm on a voluntary basis before the formal increase in size was made.

Despite the reduction in female crab that can be landed, only three permit holders (including the late submission) were opposed to the increase. Eleven permit holders felt that it was important to respond to express their support for the increase.

The Impact Assessment (IA) that accompanied the Potting Permit Byelaw reported that from the consultation with fishermen there was widespread support for the increase. The review process involving all active potters in the district would substantiate the view expressed in the IA.

Those fishermen opposed to the increase highlighted the lack of scientific data that was used to support the change. In the IA the Authority felt that the crab and lobster fisheries in the district were likely to be experiencing high fishing pressure and that an increase in the size would reflect good management practice. The report from Dr Bell at Cefas summarised that the increase in size would result in 20% additional spawning potential and was likely to support the achievement of Maximum Sustainable Yield in the absence of other effort controls.

## **Recommendation**

**Officers conclude that the information obtained from the review supports the size increase in female edible crab that was introduced on 17<sup>th</sup> March 2015. The officers' recommendation is to maintain the size of female edible crab at 150mm carapace width.**