



Inshore Fisheries and
Conservation Authority

RESEARCH REPORT

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HORSESHOE POINT COCKLE STOCK ASSESSMENT

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HORSESHOE POINT COCKLE SURVEY

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Introduction

When the old Sea Fisheries Committees transformed into the Inshore Fisheries and Conservation Authorities on April 1st 2011, Eastern IFCA gained a small section of the Lincolnshire coast that had formally been under the jurisdiction of North Eastern Sea Fisheries Committee. This area, incorporating the coast between the Donna Nook bombing range and Haile Sand fort included a small cockle bed at Horseshoe Point. For survey and reporting purposes, this bed has been divided into three component beds named Horseshoe Point, Grainthorpe Haven West and Grainthorpe Haven East. Figure 1 shows the location of these beds.



Figure 1 – Chart showing the location of the Horseshoe Point cockle beds on Haile Sand

Historically these beds have supported small but valuable fisheries, attracting fishers from Boston and King’s Lynn in addition to local hand-gatherers. On occasions, transient fishers have also exploited the stocks from further afield, some travelling from as far away as Wales and the west coast. Annual landings from this fishery have sometimes exceeded 700 tonnes, but like many cockle beds, the stocks in the area are by no means consistent (MacDonald, 2008).

Management of these beds is conducted under NESFC Byelaw XXIV (Humber Estuary Cockle Fishery Byelaw), which was adopted by EIFCA in 2011 during the transition from

ESFJC. This byelaw restricts cockle fishing on these beds to hand gathering between the months of September and April, inclusive. Permit holders are allowed to harvest a maximum of 500 kg of cockle per day (otherwise 5 kg/day for non-permit holders).

In 1996 NESFC commenced bi-annual surveys to estimate the weight of commercially sized stock within the beds. In 2000 it was estimated that there were over 400 tonnes of commercially available cockles within the Horseshoe Point beds but these had declined to between 60-90 tonnes by 2003 (NESFC, 2004). By the spring survey of 2004 fishable-sized stocks were estimated to have fallen to just 9 tonnes, but by that autumn a stock of 226 tonnes was recorded. NESFC attributed this discrepancy in the figures to a change in survey method and the ephemeral nature of the bed rather than a dramatic increase in stock. By the autumn of the following year the stocks had declined back to 85 tonnes and to 51 tonnes by the autumn of 2006 (NESFC 2005 & 2006).

Since taking over the site in 2011, EIFCA have conducted eight stock surveys to date (January and August 2011, January 2012, February and August 2013, August 2014, July 2015 and July 2016). The results of these surveys have been reported in Jessop et al 2011, Jessop et al 2012, Strigner 2014 and Jessop 2015. This report covers the details of the July 2016 survey. Observations made during the surveys indicate the bed is suffering similar atypical mortality to what has been observed to be occurring in the Wash since 2008 and the Burry Inlet since 2004. This was first noted when an ESFJC research officer conducted a site visit to the beds in 2010 in preparation for taking over the site, but the fluctuating stocks recorded prior to this by NESFC suggest it may have been occurring longer. The surveys found that there had been good spatfalls in 2010, 2011 and 2012, but the majority of these cockles had died during the following summer before reaching the minimum landing size. The stocks during this period fluctuated between 12 tonnes and 105 tonnes. There was a further good settlement in 2013. When surveyed again in August 2014, these were found to have grown slightly slower than was usual for the site, but they had survived the summer. Although only 18 tonnes of the 928 tonne stock had attained the MLS of 16mm width, a further 200 tonnes had reached 14mm. Because these were anticipated to reach MLS within a few months, plans were put forward to open the beds in March 2015.

Because these beds had remained closed since 2002, there were a number of challenges that needed to be overcome before they could be commercially fished. Shellfish can only be commercially harvested from areas in which the Food Standards Agency (FSA) has classified the water as being hygienically safe. Maintaining this classification requires regular monthly sampling. Unfortunately, due to the low stock levels, this sampling had ceased in 2004. In 2011 EIFCA had approached the relevant authority, East Lindsey

District Council, to recommence sampling, but stock levels had been too low at that time to find sufficient sample material. With little prospect of further fisheries due to the high annual die-offs, no further attempts had been made to reinstate an expensive sampling regime. Following the survey in August 2014, East Lindsey District Council was requested to recommence sampling. Conducting a Sanitary Survey and collecting the required number of samples meant the initial sampling regime could not be completed before April, however, after which the beds were eventually given a Class A water classification. (For sampling results see the CEFAS national microbiological monitoring results at: <https://www.cefas.co.uk/publications-data/food-safety/classification-and-microbiological-monitoring/england-and-wales-classification-and-monitoring/shellfish-monitoring-results/details/?species=COC&connection=SHS&PointID=B067J>).

This left only a very short window in which the beds could be harvested before the closed season began in May. Regaining water classification status for the site was not the only obstacle encountered when attempting to open this fishery, however. The site is within a Marine Protected Area, part of which is prohibited to fishing in order to protect eelgrass (*Zostera spp*) beds (see figure 2). The area prohibited to fishing includes the whole West Grainthorpe Haven bed, half of the East Grainthorpe bed and a small part of the Horseshoe Point bed.

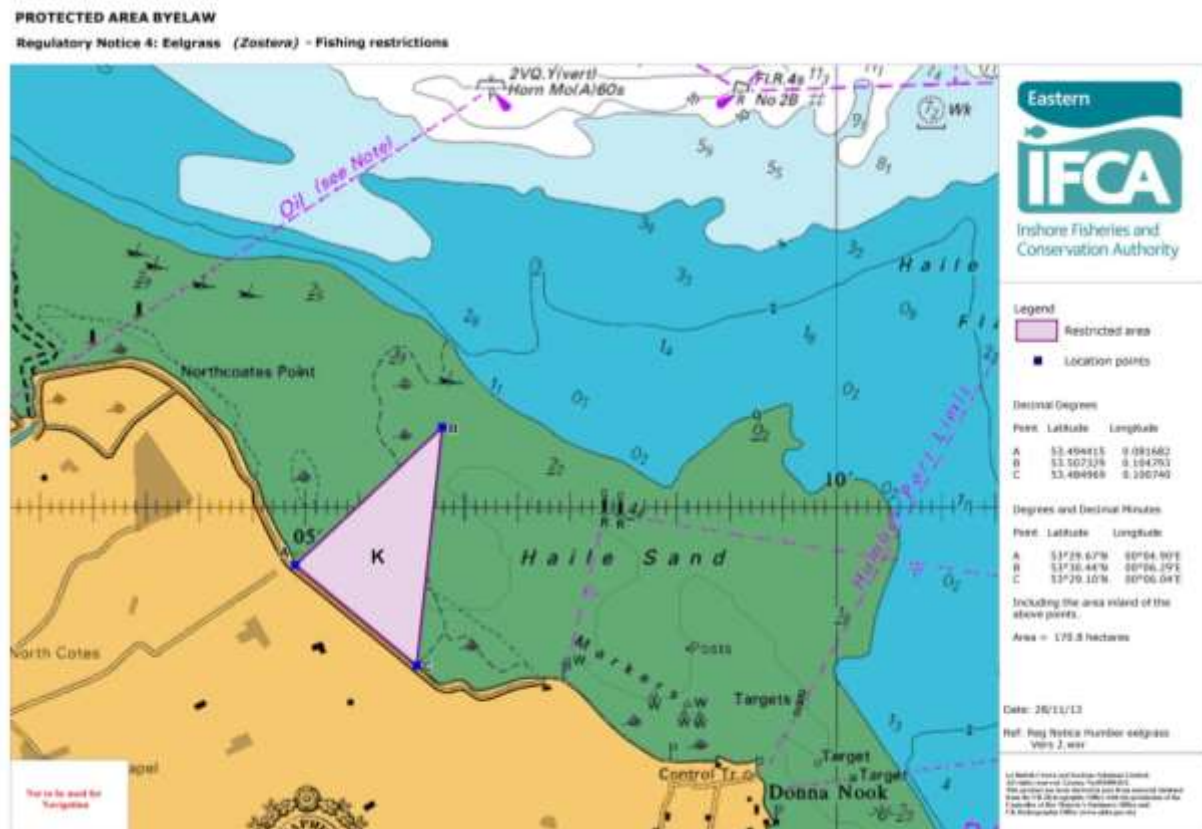


Figure 2 - Chart showing the location of the restricted fishery area at Horseshoe Point, to protect eelgrass (*Zostera*) beds.

Access to this site has traditionally been from shore, generally using off-road vehicles. Consultation with Natural England raised concerns about the adverse impacts this access could have, both to the marsh itself and disturbance to nesting birds. During liaison with members of the fishing industry and Natural England, a number of routes were considered as potential options for accessing the cockle beds. The favoured route, using an existing track that runs north-west from the Horseshoe Point car park, around the marsh, was found to cross land owned by a local Wildfowl Group. An option of laying a temporary metallic road across the marsh, thus avoiding the land owned by the Wildfowl Group was explored. During consultation, however, it was found that the car park and the marshes leading to the cockle beds were leased by a local landowner. At a site visit in May 2015, EIFCA staff met with the landowner and relevant stakeholders from the fishing industry, Natural England and East Lindsey District Council. During this meeting all parties agreed there was potential to access the site using a metallic road over the marsh, but the legalities of doing so were complex due to issues of third-party liabilities. Discussions were on-going between fishing industry representatives and the landowner regarding financial recompense and liabilities, but prior to any resolution being agreed, the opening of the Wash cockle fishery in June 2015 alleviated the immediate pressure to open these beds. To date, workable solutions still need to be agreed and implemented before future fisheries can be opened.

In June 2015, staff from East Lindsey District Council responsible for collecting the water classification samples alerted EIFCA that large numbers of dead shell were appearing on the cockle beds. EIFCA staff assessed the beds a few days later and found large numbers of cockles were either dying or had recently died. At the time 0.3% of the samples taken in the area were found to be moribund. Although this number is relatively low, a study conducted in 2012 in the Wash on atypical cockle mortality found the proportion of moribund cockles was a reasonable proxy for determining daily mortality rates (Jessop et al, 2012). This study had also found mortality rates had a strong correlation with rises in temperature, and during periods of warm weather high proportions of the stock could die. Although during the year the individual cockles had increased significantly in size, a stock survey conducted in July 2015 found the cockle biomass had declined from the 928 tonnes present the previous year to 485 tonnes. By December, East Lindsey District Council reported the stocks had declined so much, it had become difficult finding sufficient cockles for the water classification samples.

Another survey was recently conducted in July 2016. Although there is unlikely to be a fishery this year due to a good fishery presently occurring in the Wash, and the difficulties associated with accessing the beds still unresolved, it was felt the survey could provide

valuable information on whether there had been a successful spatfall and improve our knowledge on the dynamics of the die-off.

Method

The survey was conducted on foot over the low water period on July 21st 2016. This is consistent with previous summer surveys conducted by EIFCA, that have generally occurred between the end of July and the beginning of August. The method used for this survey was also that used during previous surveys.

The survey was conducted by taking samples from a predetermined regular grid of sample stations that were approximately 100 metres apart. The positions of these stations are consistent with those used during previous surveys in 2013 and 2014. The Horseshoe Point bed consisted of 36 sampling stations, while Grainthorpe Haven beds each consisted of 15 stations. Figures 3 and 4 show the positions of the stations on these beds. Hand-held GPS units were used to locate the position of the stations in the field.

Samples were collected by sieving the sediment taken from 0.1m² quadrates. All cockles found in the samples were washed and retained in waterproof bags, one bag per station. Each sample was labelled with the bed name and station number written on waterproof paper.

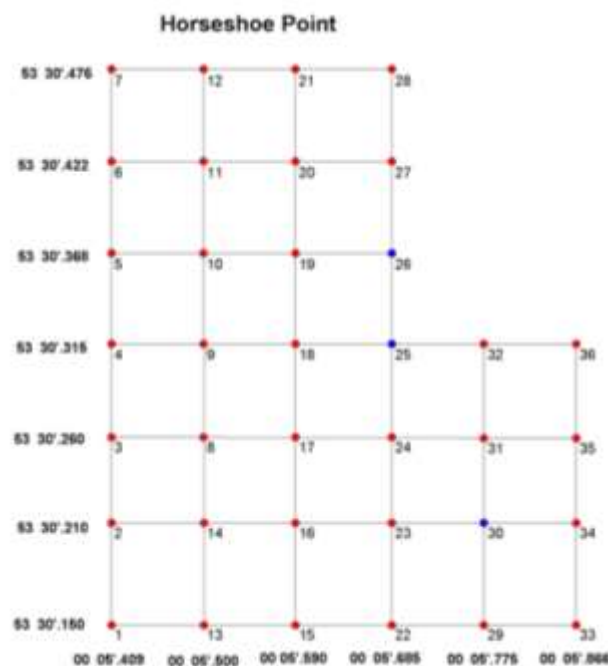


Figure 3 – Positions and station numbers of the sample stations on the Horseshoe Point bed.

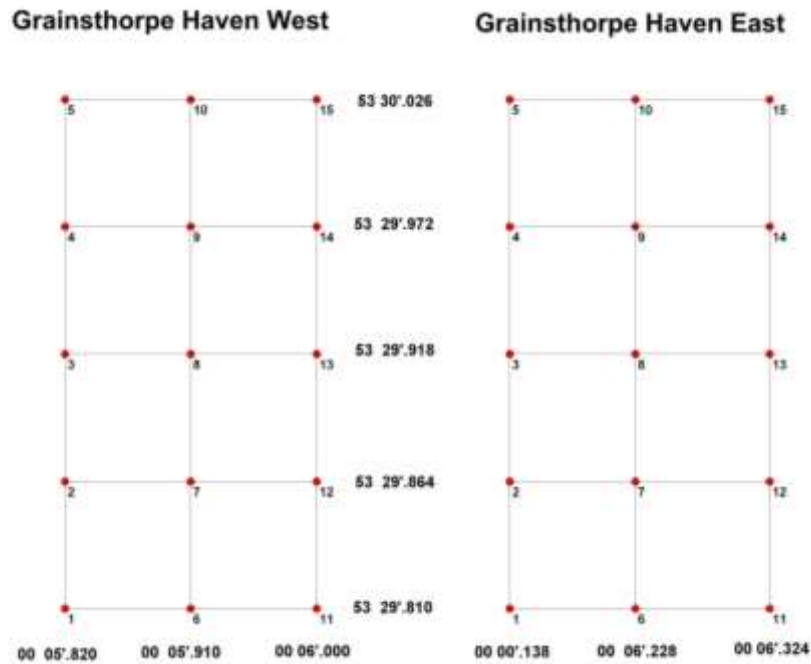


Figure 4 – Positions and station numbers of the sample stations on the Grainthorpe Haven beds.

Additional environmental data were recorded at each station, including the type of sediment present, the number of lugworm, *Arenicola marina*, casts present in the quadrat, the presence or absence of sand mason worms, *Lanice conchilega*, and the number of Baltic tellins, *Macoma balthica*, that were present in the sample.

Once ashore the retained cockles were measured by length and width to the nearest 1mm. These were divided into year-class groups that were further sub-divided into two size groups of ≥ 16 mm widths and < 16 mm widths (differentiating those that had attained MLS from those that had not). Each group was then weighed using electronic scales accurate to 0.01g.

The data was entered into Excel spreadsheets and transferred to MapInfo v12.0 GIS software. Interpolated density models were drawn around the data points, creating separate layers for the following cockle densities:

- 10 – 99 cockles/m²
- 100 – 499 cockles/m²
- 500 – 999 cockles/m²
- 1,000+ cockles/m²

For the 10 – 99 density layer, the borders of the polygon extended halfway between stations supporting cockles and those that didn't. For the subsequent layers, consideration

was given to the neighbouring stations when considering how far borders extended. Two separate layers were drawn to show the extent of $\geq 16\text{mm}$ cockles and the extent of $< 16\text{mm}$ cockles.

The 10 – 99 cockles/m² density layers were used to estimate the area of cockle coverage in each bed. Structured Query Language (SQL) tools in MapInfo were used to determine the mean numbers of cockles present at each station and their mean biomass. The biomass of each group in each bed was determined by multiplying their mean biomass by the bed area.

The size frequency of cockle widths were recorded in Excel and displayed as histograms.

Results

Tables 1 to 3 show the stock summaries for the three beds surveyed on July 21st 2016, while figures 5 and 6 show the distributions of cockles $\geq 16\text{mm}$ width and $< 16\text{mm}$ width. Figures 7 to 9 show the size distribution of the cockles found on each bed.

Table 1 - Summary of the cockle stocks at the Horseshoe Point bed in July 2016

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m ⁻²)	Mean Weight (t/ha ⁻¹)	Stock biomass (t)
$\geq 16\text{mm}$	12.2	15.45	1.27	14
$< 16\text{mm}$	12.6	40.00	0.98	12
Yr-0 Spat	4.8	74.00	0.32	1.5

Table 2 - Summary of the cockle stocks at the West Grainthorpe Haven bed in July 2016

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m ⁻²)	Mean Weight (t/ha ⁻¹)	Stock biomass (t)
$\geq 16\text{mm}$	1.8	10.00	0.55	1
$< 16\text{mm}$	3.7	95.00	2.09	8
Yr-0 Spat	0.9	10.00	0.03	~

Table 3 - Summary of the cockle stocks at the East Grainthorpe Haven bed in July 2016

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m ⁻²)	Mean Weight (t/ha ⁻¹)	Stock biomass (t)
$\geq 16\text{mm}$	4.7	24.00	1.69	8
$< 16\text{mm}$	7.9	77.50	1.50	12
Yr-0 Spat	0.9	20.00	0.13	0.1

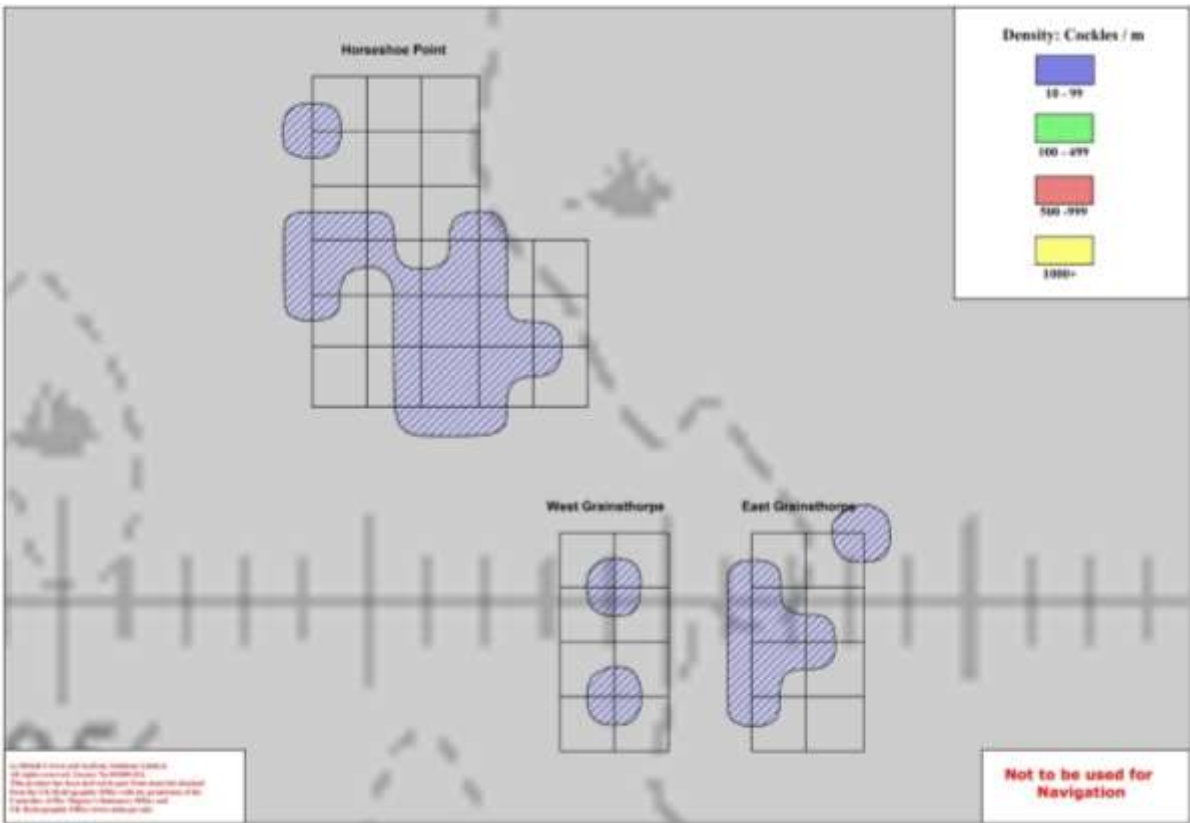


Figure 5 – Distribution of cockles ≥ 16 mm width. July 2016

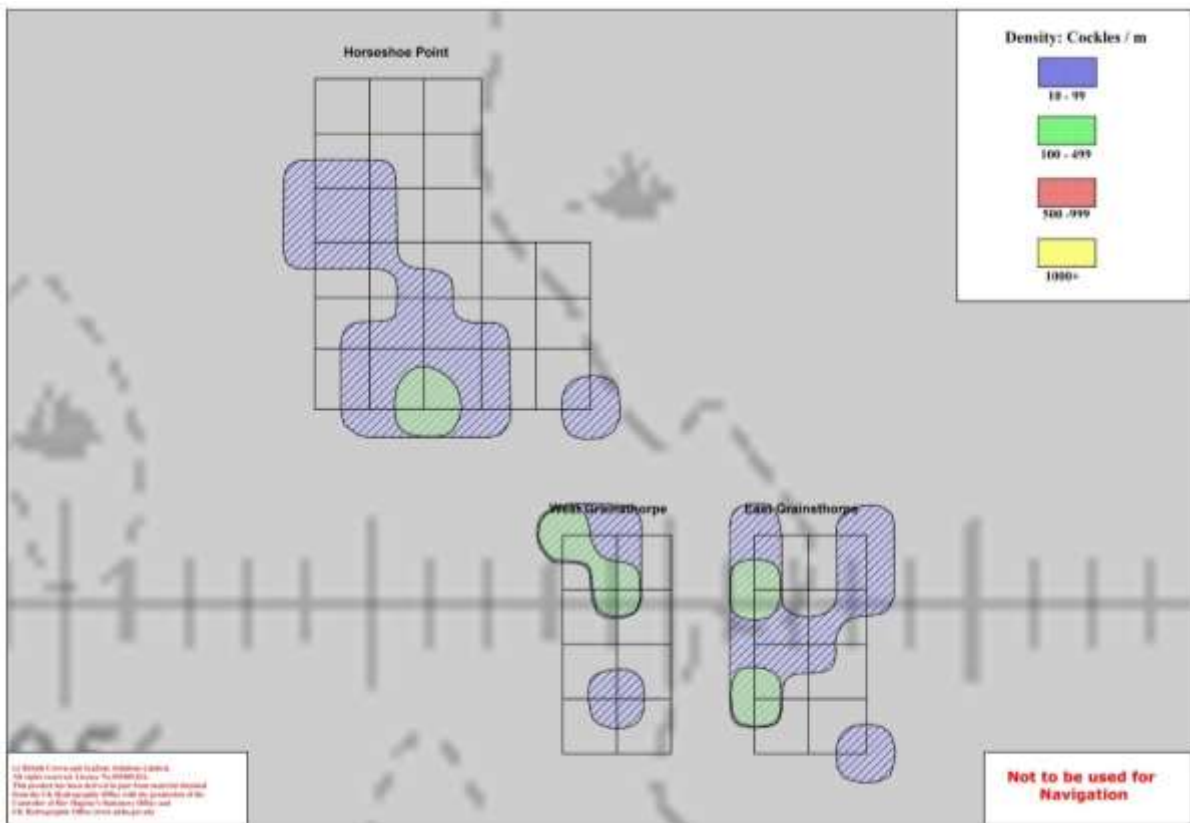


Figure 6 – Distribution of cockles < 14 mm width. July 2016

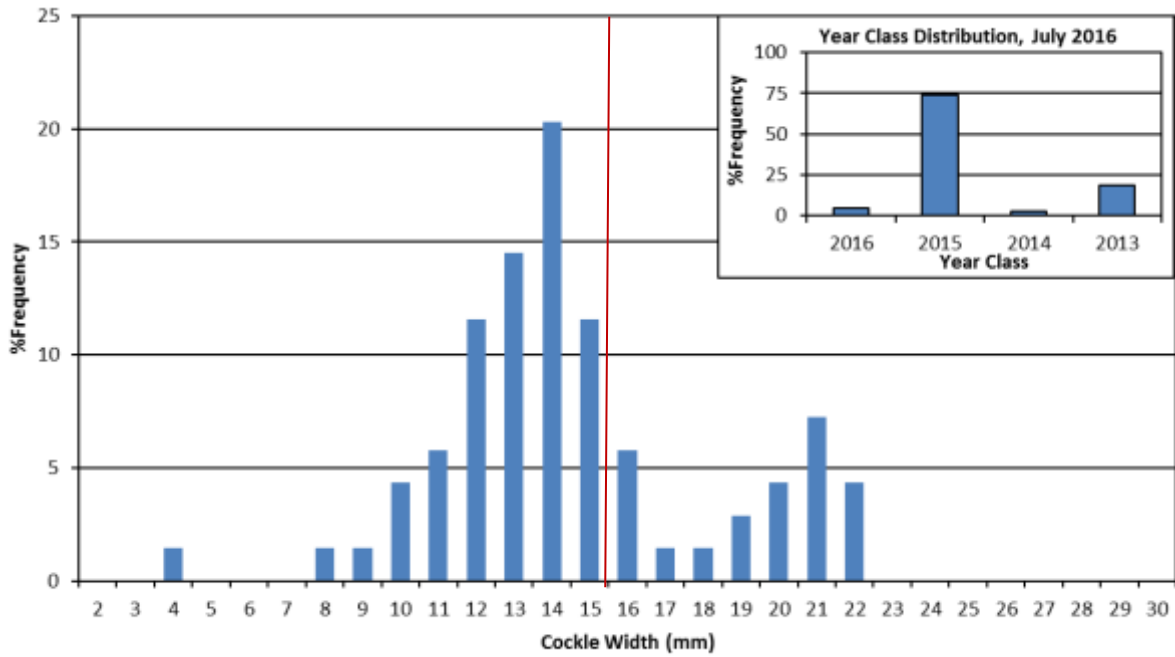


Figure 7 – Size frequency of cockles at the Horseshoe Point bed. July 2016

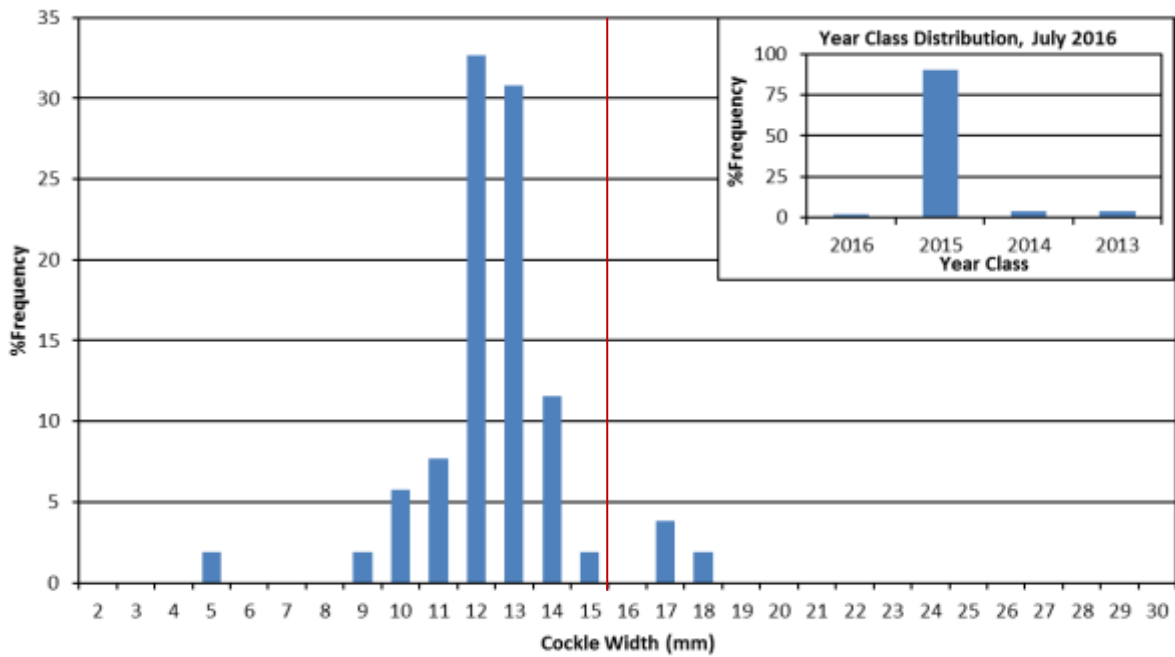


Figure 8 – Size frequency of cockles at the West Grainthorpe bed. July 2016

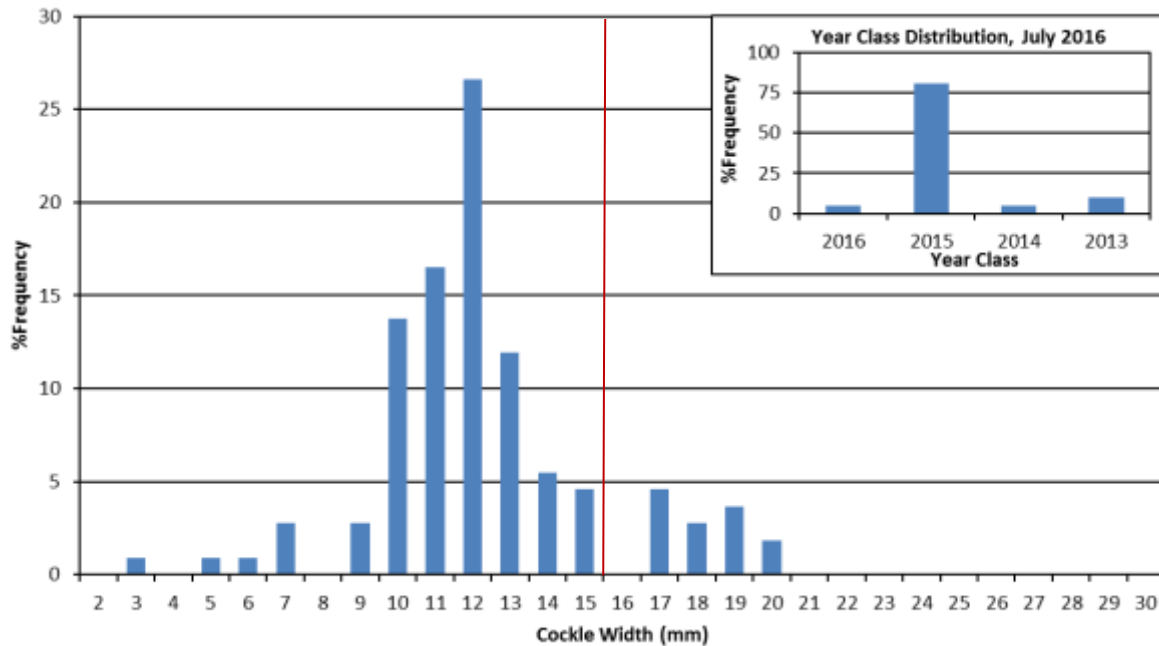


Figure 9 – Size frequency of cockles at the East Grainthorpe bed, July 2016

The 2016 survey found that the cockle stocks on these three beds had declined from a total of 485 tonnes in 2015 to 58.6 tonnes. This appeared mainly due to losses among the population of 2013 year-class cockles that had been the predominant cohort in 2015. At the time of the 2016 survey the dominant cohort was from a 2015 settlement, but this was much smaller than the 2013 settlement had been. There was evidence of recently settled cockles, mainly on the Horseshoe Point bed, but these were only present in comparatively small numbers. The only cockles that had attained the 16mm width MLS were those remaining 2013 year-class cockles and a number of the faster-growing 2014 year-class cockles.

Discussion

Although, historically, the cockle beds at Horseshoe Point have supported a small artisanal fishery, these beds have not been opened since 2002. In 2010 the stocks in this area were observed to be suffering from the same “atypical” mortality symptoms as have been witnessed in the Wash stocks since 2008, characterised by gaping, moribund cockles laying on the surface during warm summer months. Although the causal factor for the mortalities is yet to be confirmed, observations made in the Wash indicate cockles are most vulnerable during warm summer weather once they have reached a size of sexual maturity. While this usually affects cockles in the Wash that are 2+ years old, the cockles

at Horseshoe Point are typically faster growing, and as such have tended to die during the summer following their spawning, when they are only just a year old.

As the fishery cannot be opened until September 1st, this can result in the majority of the fishable stocks dying before they can be fished. Unlike the three previous settlements, a high proportion of the 2013 cohort survived their first year, possibly as a result of cooler weather in 2014 slowing their growth and stalling spawning behaviour that year. Although these stocks were present in fishable densities in July 2015, a number of anthropogenic obstacles associated with accessing the beds from shore prevented a fishery from being opened. These stocks were subsequently observed to be suffering high mortalities before the obstacles could be overcome and the 2016 survey revealed most had died. The relatively low numbers of 2014 and 2015 year-class cockles found on the beds during the 2016 surveys indicate the prospects for another fishery before 2018 are poor.

Overcoming the access issues are likely to be both complex and costly. Preventing damage to the green marsh and disturbance to nesting birds while accessing the marsh could potentially require a temporary road surface being laid. Further, the fishermen hoping to fish these beds will need to gain permission from the local land owner in order to cross the parts of the marsh under his ownership. An initial meeting in 2015 indicated this would require financial recompense. Although neither of these barriers are insurmountable, the cost of potential solutions could make this small-scale fishery commercially unviable. At this point it is questionable whether these beds will be opened commercially again, particularly as the effects of "atypical" mortality will severely restrict potential windows fishing opportunity. On one hand, such small-scale fisheries do provide fishermen with a welcome livelihood during times when larger fisheries are suffering periods of decline. In some instances, this input can make the difference between remaining in business or going bankrupt. On the other hand, however, public money is being used to maintain the water classification and to conduct annual stock surveys.

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