



Inshore Fisheries and  
Conservation Authority

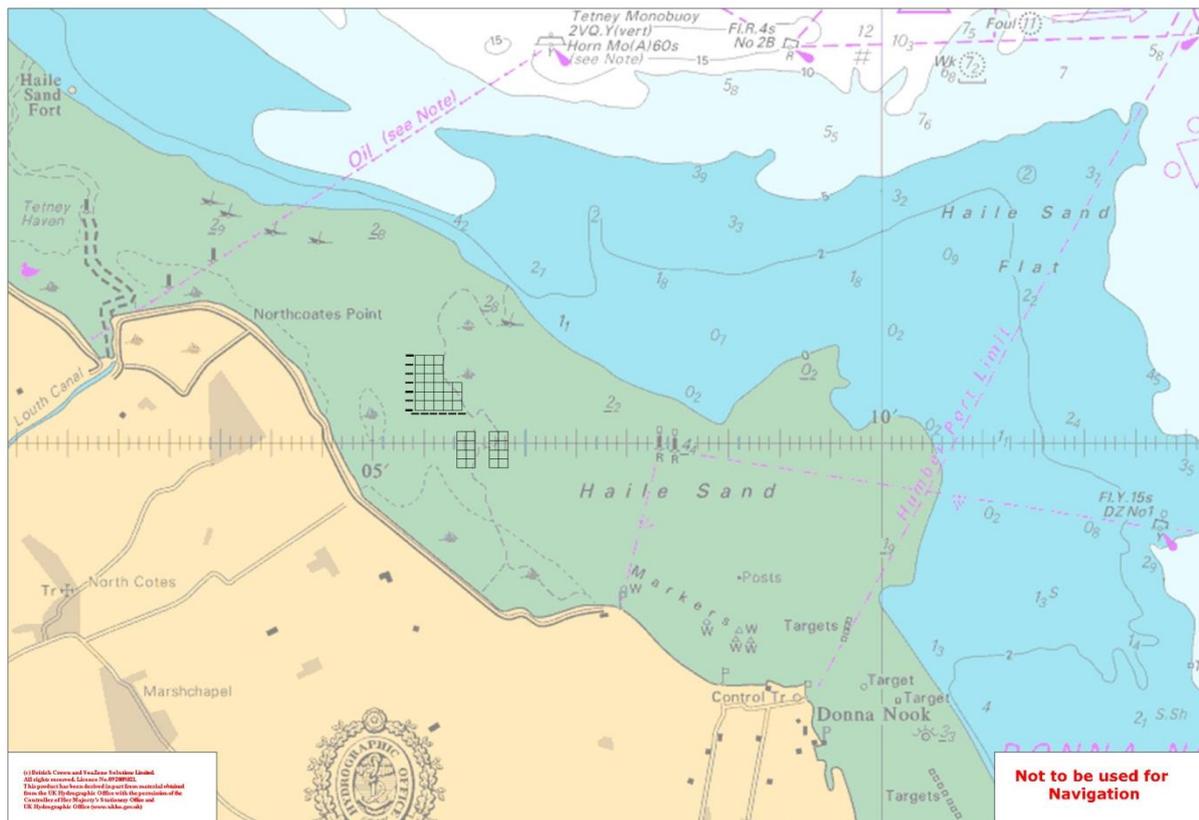
## **Horseshoe Point Cockle Stock Assessment**

**Research Report 2017**

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## 1. Introduction

When the Sea Fisheries Committees transformed into the Inshore Fisheries and Conservation Authorities (IFCAs) in 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 Donna Nook 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).



**Figure 1.** Location of Horseshoe Point cockle beds (Horseshoe Point, Grainthorpe Haven West and Grainthorpe Haven East) on Haile Sand.

Historically, these beds 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 exceeded 700 tonnes, however the stocks in the area are by no means consistent (MacDonald, 2008).

Management of these beds is conducted under North Eastern Sea Fisheries Committee (NESFC) Byelaw XXIV (Humber Estuary Cockle Fishery Byelaw), which was adopted by Eastern IFCA in 2011 during the transition from Eastern Sea Fisheries Joint Committee (ESFJC). This byelaw restricts cockle fishing on these beds to hand gathering between the months of September and April. Permit holders may 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 commercial sized stock in the beds. In 2000, it was estimated that there were >400 tonnes of commercially available cockles within the Horseshoe Point beds. Stock, however, declined to 60 - 90 tonnes by 2003 (NESFC, 2004). In the spring of 2004 fishable stock was estimated at just 9 tonnes,

but in the autumn the same year 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 declined back to 85 tonnes, and to 51 tonnes by autumn, 2006 (NESFC, 2005; NESFC, 2006).

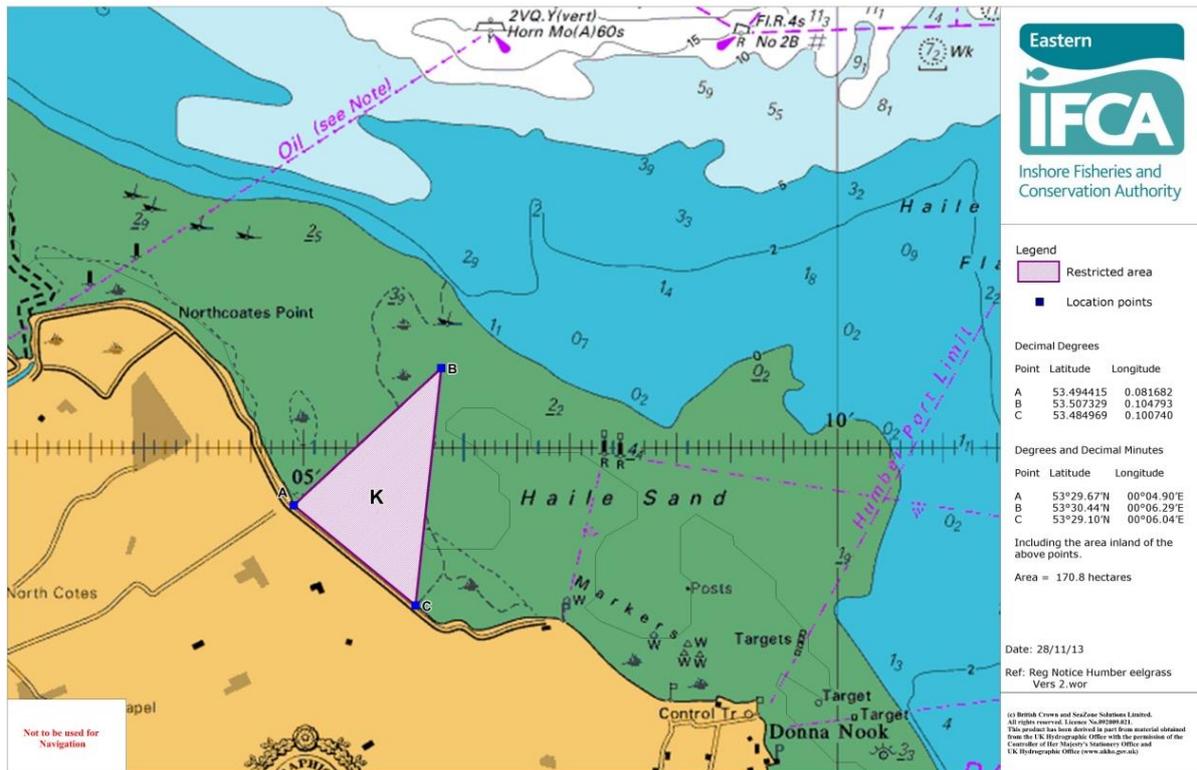
Eastern IFCA have conducted nine stock surveys to date (January and August 2011, January 2012, February and August 2013, August 2014, July 2015, July 2016 and July 2017) (Jessop *et al.*, 2011; Jessop *et al.*, 2012; Strigner, 2014; Jessop, 2015 and Jessop, 2016). Observations made during the surveys 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 suggested it may have been occurring for longer. The surveys found that there had been good spatfalls in 2010, 2011 and 2012, but most of these cockles had died during the following summer before reaching the 16mm minimum landing size (MLS). Stocks during this period fluctuated between 12 and 105 tonnes. Settlement was good again in 2013. When assessed 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, 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 to opening a commercial fishery. Shellfish can only be commercially harvested from areas classified as hygienically safe by the Food Standards Agency. Maintaining this classification requires monthly sampling. Unfortunately, due to low stocks, this sampling was stopped in 2004. In 2011, Eastern IFCA approached East Lindsey District Council to recommence sampling, but stock levels were too low at the time to find sufficient sample material. With little prospect of further fisheries due to high annual die-offs, no further attempts were made to reinstate the sampling regime. Following a further 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 given a Class A water classification. This left only a very small window in which the beds could be harvested prior to the closed season in May.

Regaining water classification status for the site was not, however, the only obstacle encountered when attempting to open the beds. The site is within a Marine Protected Area, part of which is closed to fishing to protect eelgrass (*Zostera* spp.) beds (Figure 2). The restricted area includes the whole Grainthorpe Haven West bed, half of the Grainthorpe Haven East bed and a small part of the Horseshoe Point bed.

**PROTECTED AREA BYELAW**

Regulatory Notice 4: Eelgrass (*Zostera*) - Fishing restrictions



**Figure 2.** Location of the restricted area (K) at Horseshoe Point, closed to fishing in order to protect *Zostera* spp. (eelgrass) beds.

Access to this site has traditionally been from shore using off-road vehicles. Consultation with Natural England raised concerns about 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 access options to 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 group was explored. During consultation, however, it was found that the car park and marshes leading to the cockle beds were leased by a local landowner. At a site visit in May 2015, Eastern IFCA staff met 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 immediate pressure to open these beds. To date, solutions still need to be agreed and implemented prior to the opening of any future fisheries.

In June 2015, staff from East Lindsey District Council responsible for collecting water classification samples alerted Eastern IFCA that large amounts of dead shell were appearing on the cockle beds. Within days, Eastern IFCA staff assessed the beds 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.

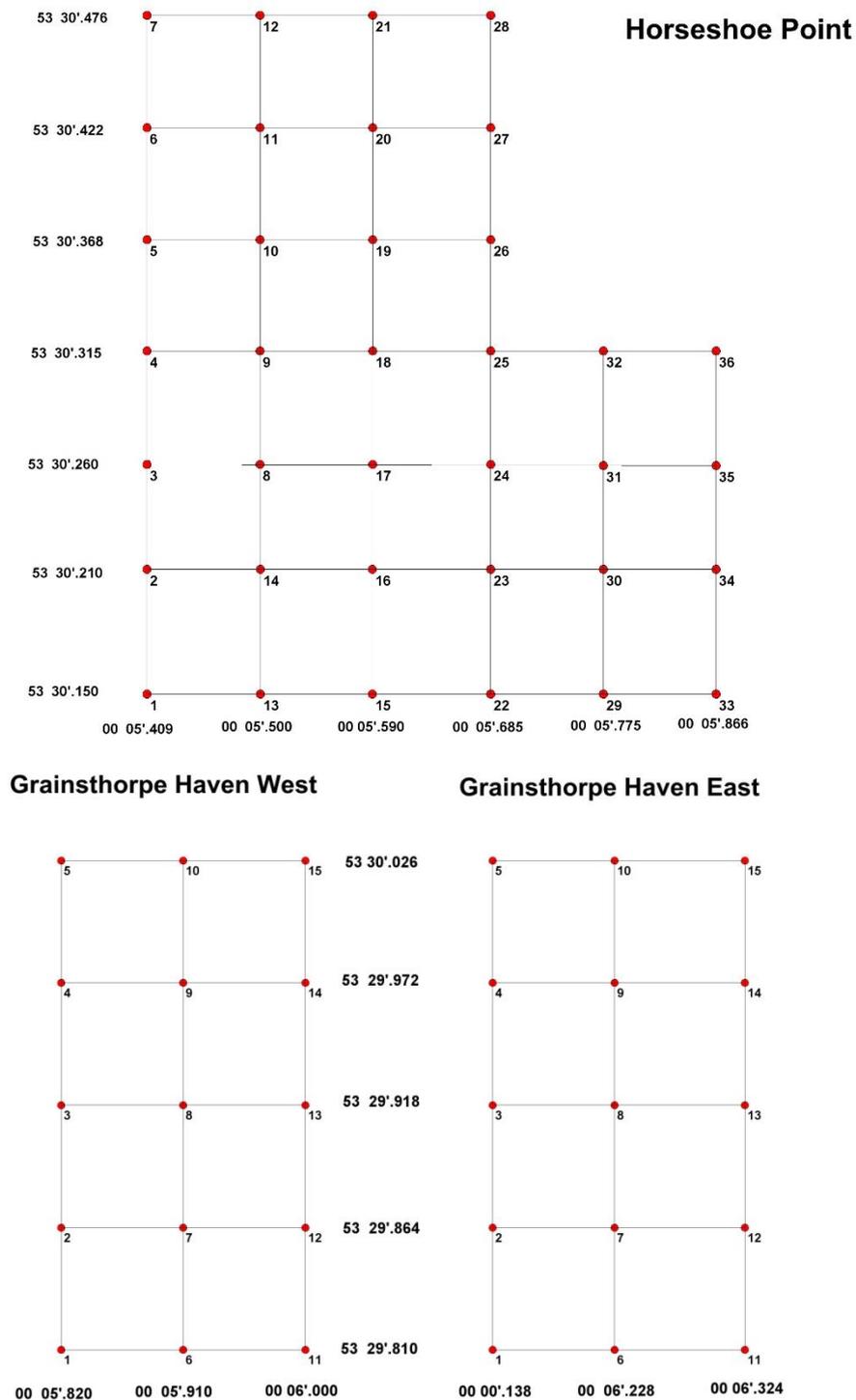
Cockle stocks declined significantly between the summers of 2015 and 2016, from 485 to 58.6 tonnes. This was expected as by December, East Lindsey District Council reported the stocks had declined to such a great extent that it was becoming difficult to find sufficient cockles for water classification samples. This report covers the details of the most recent survey in July 2017. The aims of this survey were to provide information on whether there had been a successful spatfall between the summers of 2016 and 2017, to assess the opportunity for a fishery and to improve Eastern IFCA's understanding of cockle population dynamics at Horseshoe Point.

## **2. Methods**

The survey was conducted on foot over the low water period on July 25, 2017. This is consistent with previous summer surveys conducted by Eastern IFCA, that have generally occurred between the end of July and beginning of August. The method used for this survey was also consistent with previous surveys.

The survey was conducted by taking samples from a predetermined regular grid of sample stations, with each station approximately 100 metres from the next. The positions of these stations are consistent with those used in previous surveys from 2013 to 2016. The Horseshoe Point bed consisted of 36 sampling stations, while Grainthorpe Haven West and East consisted of 15 sampling stations each (Figure 3; Figure 4). 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 0.1m<sup>2</sup> quadrats. All cockles found in the samples were washed and retained in waterproof bags, one per station. Each bag was labelled by bed name and station number.



**Figure 4.** Positions and station numbers of sampling stations on the Horseshoe Point bed, Grainthorpe Haven West and East beds

Additional environmental data was recorded at each station. This data included sediment type, number of *Arenicola marina* (lugworm) casts present, presence or absence of *Lanice conchilega* (sand mason worms), and number of *Macoma balthica* (Baltic tellins) present in each 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  $\geq 16\text{mm}$  and  $< 16\text{mm}$  widths, differentiating those that had attained MLS from those that had not. Each group was then weighed using electronic scales accurate to 0.01g.

Data was transferred from Microsoft Excel to MapInfo v12.0. Interpolated density models were drawn around data points, creating separate layers for the following cockle densities:

- 10 – 99 cockles/m<sup>2</sup>
- 100 – 499 cockles/m<sup>2</sup>
- 500 – 999 cockles/m<sup>2</sup>
- 1,000+ cockles/m<sup>2</sup>

For the 10 – 99 cockles/m<sup>2</sup> layer, the borders of the polygon extended halfway between stations that supported cockles and those that didn't. For subsequent layers, consideration was given to densities at neighbouring stations when considering how far borders extended. Two layers were drawn to show the extent of  $\geq 16\text{mm}$  cockles and  $< 16\text{mm}$  cockles.

The 10 – 99 cockles/m<sup>2</sup> density layers were used to estimate the area of cockle coverage in each bed. Structured Query Language tools in MapInfo were used to determine the mean numbers of cockles present and mean cockle biomass at each station. The biomass of each group in each bed was determined by multiplying their mean biomass by the bed area.

### 3. Results

Stock summaries for the beds surveyed on July 25, 2017 found a total stock over the three beds of 403 tonnes, including cockles of all sizes (Tables 1 - 3). Of this, there was a total fishable stock of just 13.5 tonnes, with almost 50% of the total stock identified as Yr-0 spat. Cockles were not settled consistently throughout the three beds, but instead were found in dense patches, on the Horseshoe Point and Grainthorpe Haven East beds only (Tables 1 – 3; Figure 5).

**Table 1.** Summary of cockle stocks at Horseshoe Point bed on July 25, 2017

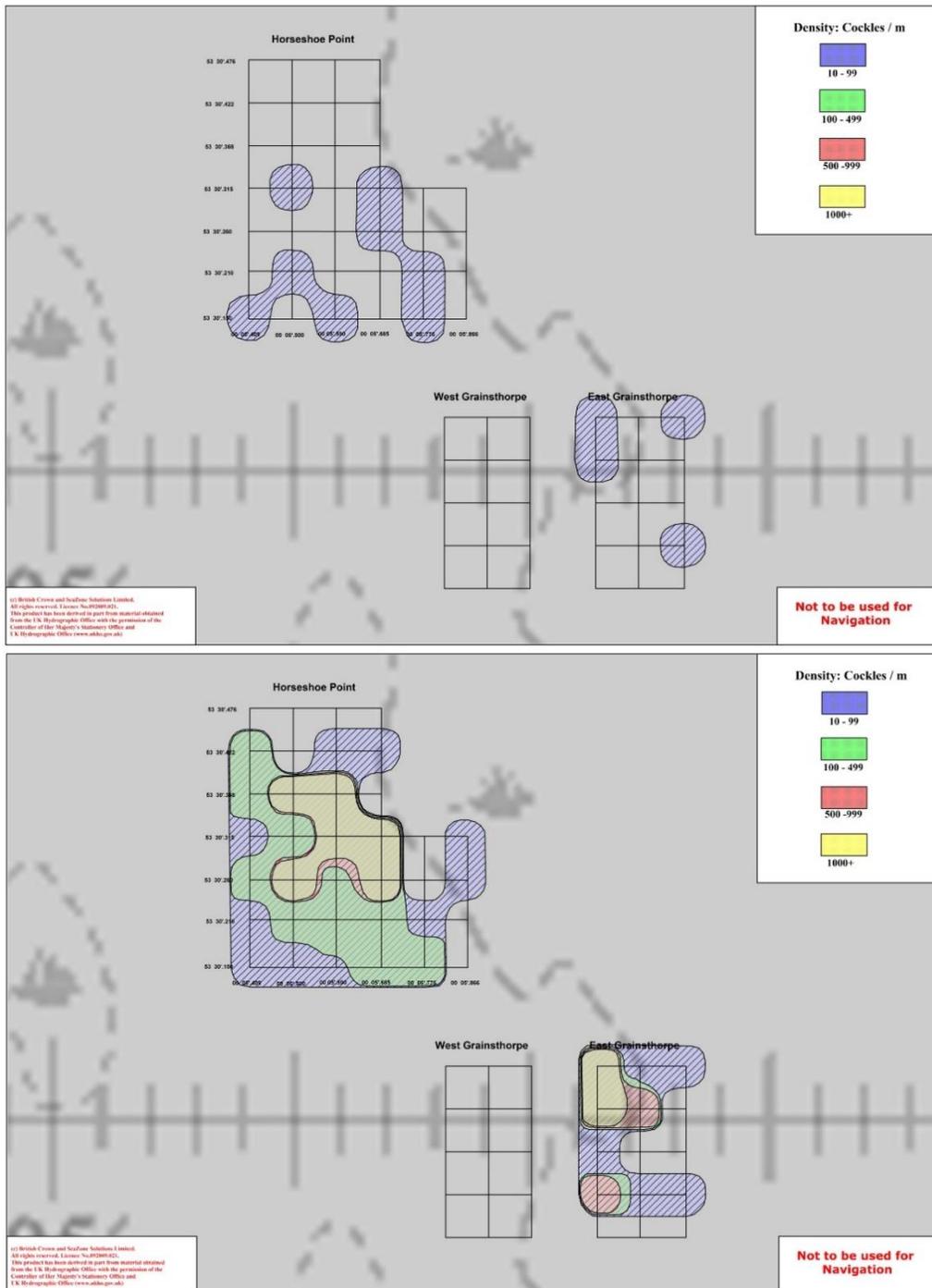
Cockle Width (mm)	Bed Area (ha)	Mean (cockles m <sup>-2</sup> )	Density	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	7.9	16.25		1.32	10.5
<16	25.75	681.54		11.76	303
Yr-0 Spat	25.75	682.69		11.81	304

**Table 2.** Summary of cockle stocks at the West Grainthorpe bed on July 25, 2017

Cockle Width (mm)	Bed Area (ha)	Mean (cockles m <sup>-2</sup> )	Density	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	0	0		0	0
<16	0	0		0	0
Yr-0 Spat	0	0		0	0

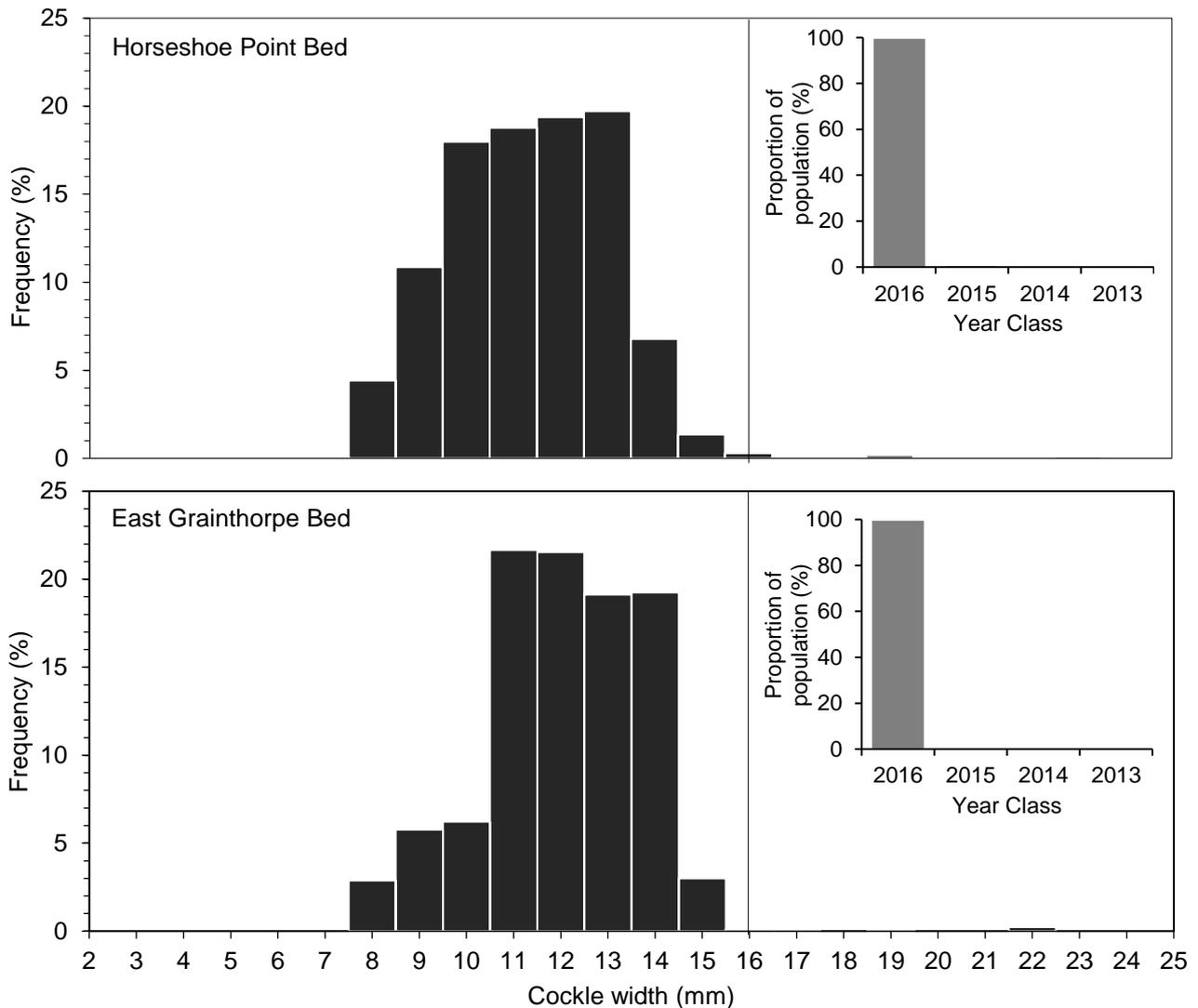
**Table 3.** Summary of cockle stocks at the East Grainthorpe bed on July 25, 2017

Cockle Width (mm)	Bed Area (ha)	Mean (cockles m <sup>-2</sup> )	Density	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	3.6	12.5		0.86	3
<16	8.6	958.89		10.08	87
Yr-0 Spat	8.6	960.00		10.12	87



**Figure 5.** Distribution and density (10-99 cockles/m<sup>2</sup>: Blue, 100-499 cockles/m<sup>2</sup>: Green, 500-999 cockles/m<sup>2</sup>: Pink, 1000+ cockles/m<sup>2</sup>: Yellow) of cockles measuring  $\geq 16$  mm (top) and  $< 16$  mm (bottom) in width throughout the Horseshoe Point, West Grainthorpe and East Grainthorpe beds on July 25, 2017. Because of the predominance of 2016 year-class cohort, the Yr-0 population has the same distribution as the  $< 16$  mm width.

Where cockles were present, the population had a size distribution predominantly in the 9 to 14mm range. At both beds where cockles were present, few had reached the 16mm MLS (Figure 6). The 2016 year-class cohort heavily dominated the 2017 cockle stocks, with over 99% of the populations at both Horseshoe Point and East Grainthorpe beds part of the 2016 cohort (Figure 6). Despite a greater stock biomass in 2017, cockles present were generally smaller. This points to a die-off of larger cockles surveyed between the summers of 2016 and 2017.



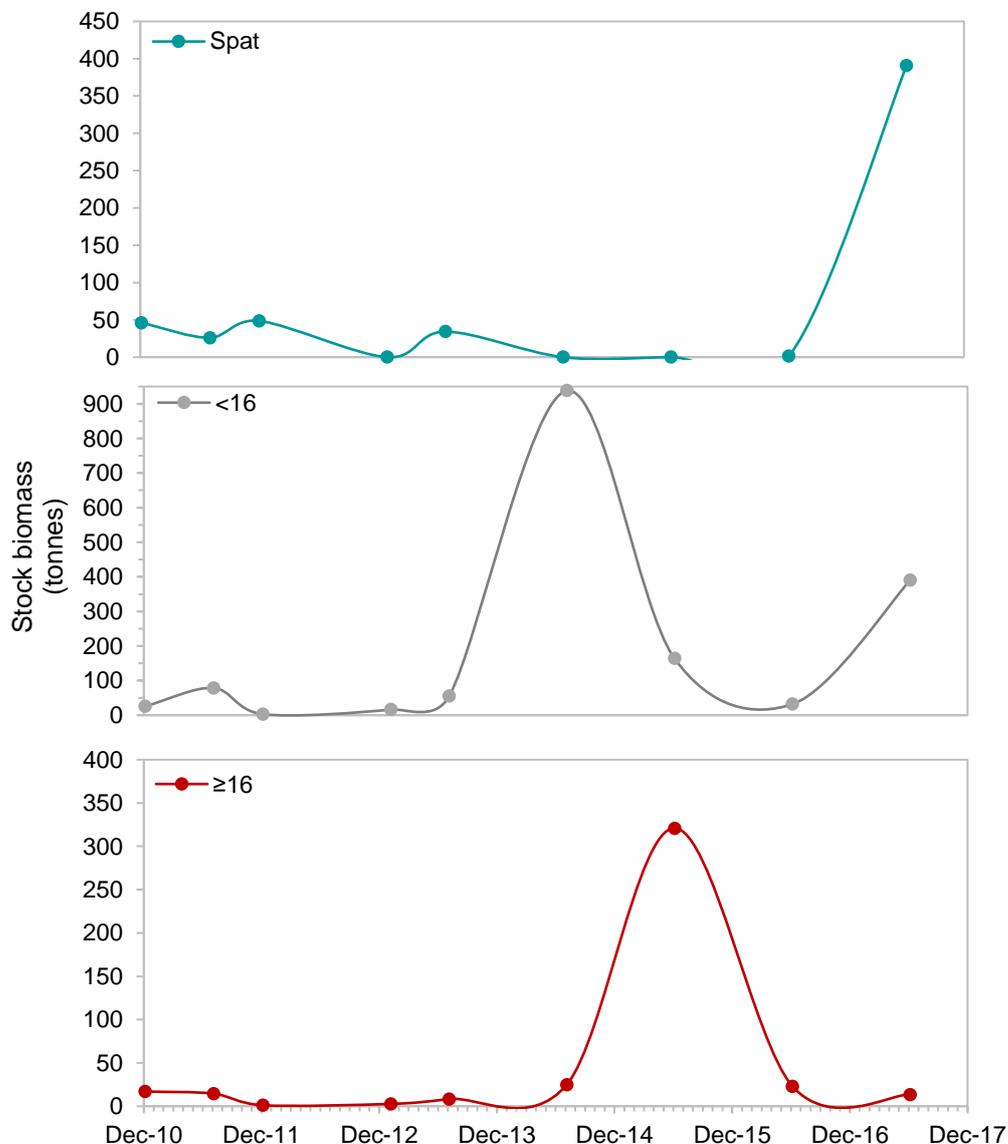
**Figure 6.** Size frequency distribution of cockles found at Horseshoe Point (top) and East Grainthorpe Beds (bottom). Inserts in top right of each figure show proportion of population from each year class. Vertical line at 16mm marks the minimum landing size of cockles in the district. Please note: West Grainthorpe bed has not been plotted as no cockles were found during the 2017 survey.

## 4. Discussion

### 4.1. Potential for a cockle fishery

Settlement between the 2016 and 2017 summer surveys on the Horseshoe Point and East Grainthorpe beds was high, with a major increase in cockle stocks between the two years at these beds. Stocks increased from just 49.6 tonnes in 2016 to 403 tonnes in 2017. The West Grainthorpe bed, however, saw a reduction from nine to zero tonnes of cockles over the same period.

When surveyed, the 2017 population had a size distribution predominantly in the 9mm to 14mm range. This survey saw the highest spat fall seen since Eastern IFCA took over responsibility for the beds (Figure 7). There is, however, no opportunity for a fishery to be opened in 2017 as just 13.5 tonnes (<2%) of cockles on the beds had already attained the 16mm MLS. Despite this, and even though these beds have not been commercially harvested since 2002, there remains a possibility that these cockles, predominantly from the 2016 year-class cohort, could grow sufficiently by spring 2018 to open cockle fisheries at the Horseshoe Point and East Grainthorpe beds.



**Figure 7.** Total stock biomass over the three beds at Horseshoe Point of each size class (spat: turquoise, <16: grey, ≥16: red) from 2010 to 2017. Please note scale for stock biomass differs between figures.

#### **4.1.1. Issues limiting the potential for a cockle fishery**

Despite the possibility of sufficient stocks to support a fishery by spring 2018, there remain issues to overcome before a fishery could be opened, including those of access, fishing restrictions due to the presence of eelgrass, water classification and atypical mortality.

##### **4.1.1.1. Access**

Overcoming the issue of access would be both complex and expensive. Preventing damage to the marsh and preventing disturbance of nesting birds while accessing the beds could potentially require a temporary road surface to be laid. Furthermore, fishers looking to harvest these beds would require permission from the local land owner to cross parts of the marsh under private ownership. A 2015 meeting indicated that this would require financial recompense. There have been discussions regarding the possibility of accessing the beds by sea, however this would require the review of Eastern IFCA byelaws.

##### **4.1.1.2. Restricted areas**

The fishing restriction, closed due to the presence of eelgrass (a small patch of which was identified again during a 2017 summer survey), would limit the area of the beds that could be fished. The area prohibited to fishing includes the whole West Grainthorpe bed, half of the East Grainthorpe bed and a small part of the Horseshoe Point bed. No cockles were found on the West Grainthorpe bed in 2017, indicating that if a fishery were to be opened in 2018, the restricted area would have only a limited impact on the productivity of the fishery as the West Grainthorpe bed would not be fished regardless of restrictions.

##### **4.1.1.3. Water classification**

East Lindsey Borough Council have suspended Environmental Health Organisation sampling for water classification, leaving the site without classification. It could take six months of sampling to regain classification. Fishers would need to request continuation of sampling directly to East Lindsey Borough Council. To allow a fishery to open in Spring 2018, a request for sampling would be required immediately.

##### **4.1.1.4. Atypical mortality**

In 2010, it was reported that cockle stocks were suffering from “atypical” mortality, characterised by gaping, moribund cockles laying on the surface during warm summer months. These symptoms were similar to symptoms previously seen in cockles >2 years old in the Wash. Data from annual surveys indicates that the cockles in Horseshoe Point typically grow faster than those in the Wash, and therefore atypical mortality has been witnessed to occur the summer following their spawning, when they are just one year old. No cause for these mortalities has been identified in either location.

The 2017 survey showed no evidence of atypical mortality occurring, and seemed to show good recovery following the major stock decline witnessed in 2015 and 2016 (Figure 7). However, if it is linked to spawning, and affects individuals >1 years old, as has been hypothesized (Jessop, 2016), it suggests we may see atypical mortality during next year’s summer survey.

## 5. References

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