



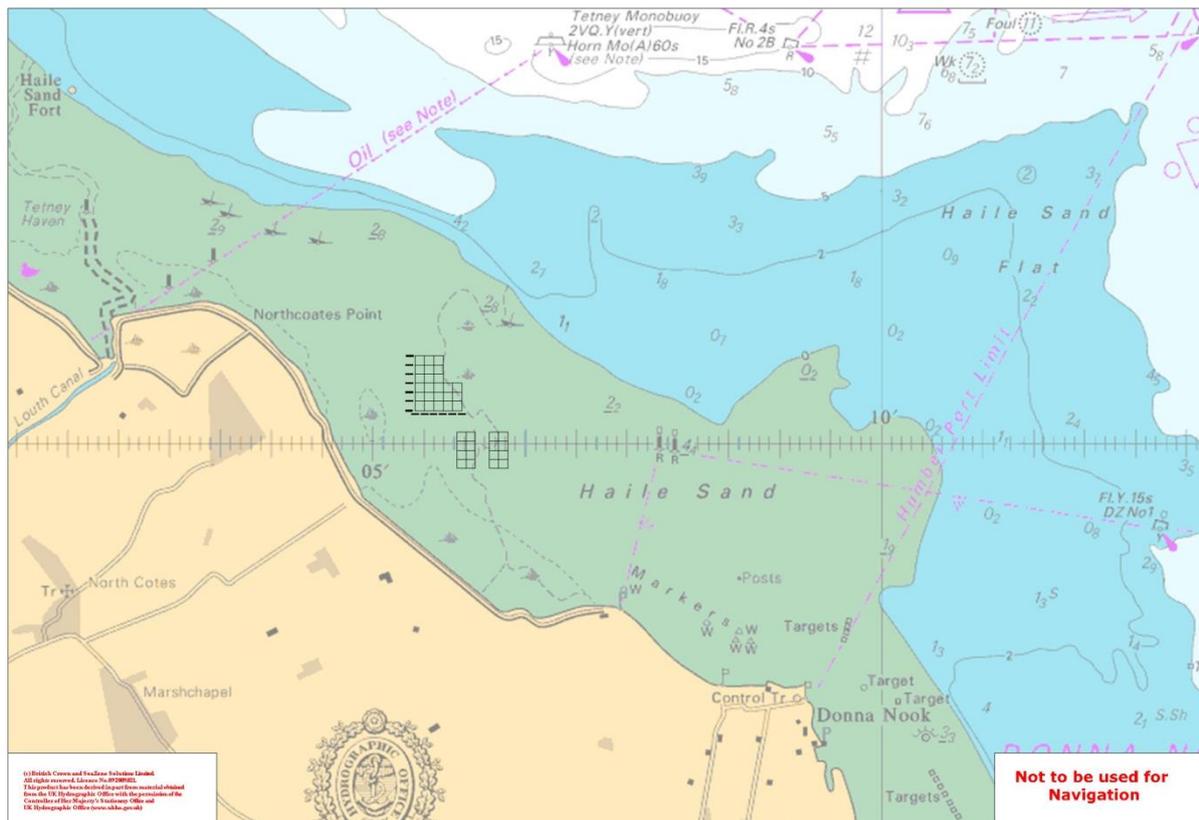
# **Horseshoe Point Cockle Stock Assessment**

Eastern IFCA Research Report 2018

Quinn, E. S.

## 1. Introduction

When Sea Fisheries Committees transformed into Inshore Fisheries and Conservation Authorities (IFCAs) in 2011, Eastern IFCA gained a small section of the Lincolnshire coast, formerly under the jurisdiction of North Eastern Sea Fisheries Committee (NESFC). This area, which incorporates the coast between Donna Nook and Haile Sand fort included a small cockle (*Cerastoderma edule*) bed at Horseshoe Point. For survey and reporting purposes, this bed has been divided into three component beds: 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 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).

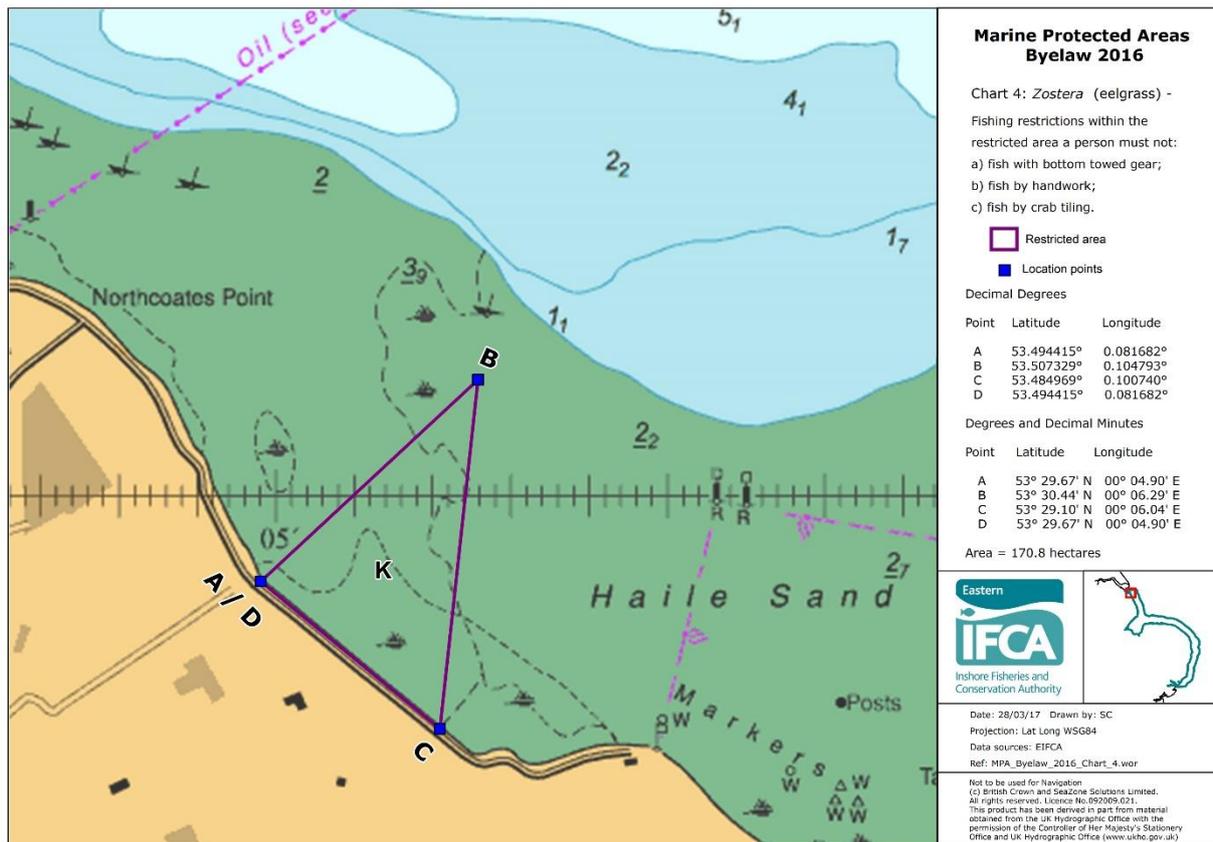
In 1996, NESFC commenced bi-annual surveys to estimate the weight of commercial sized stock in the beds. In 2000, it was estimated that there were >400 tonnes of commercially available cockles within the Horseshoe Point beds. Stock, however, declined to 60 - 90 tonnes by 2003 (NESFC, 2004). In the spring 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 ten stock surveys to date (January and August 2011, January 2012, February and August 2013, August 2014, July 2015, July 2016, July 2017 and August 2018) (Jessop *et al.*, 2011; Jessop *et al.*, 2012; Strigner, 2014; Jessop, 2015 and Jessop, 2016; Quinn and Jessop, 2017). Observations made indicate the bed has suffered similar atypical mortality to that observed in The Wash since 2008 and the Burry Inlet since 2004. This was first noted when ESFJC took over management of the site in 2010, however fluctuating stocks recorded prior to this by NESFC suggest it may have been occurring for longer. The surveys found that there were good spat falls in 2010, 2011 and 2012, but most of these cockles had died during the following summer before reaching 16 mm minimum landing size<sup>1</sup>. Stocks during this period fluctuated between 12 and 105 tonnes. Settlement was good again in 2013. When assessed again in August 2014, cockles were found to have grown slightly slower than was usual for the site but had survived the summer. Although only 18 tonnes of the 928-tonne stock had reached 16 mm, a further 200 tonnes had reached 14 mm. Because these were anticipated to reach 16 mm 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 obstacles to opening a commercial cockle fishery on the beds. 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, but 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.

---

<sup>1</sup>The Eastern IFCA Byelaw XXIV: Humber Estuary Cockles Fishery Byelaw requires fishers to obtain a permit to fish for cockles at Horseshoe Point. It also provides that "no person shall remove from the fishery any cockle which will pass through a gauge having a square aperture of 20 mm measured over each side of the square, except in accordance with the prior written authority of the Clerk". This approximately equates to a 15.5 mm cockle, resulting in the use of a 16 mm minimum landing size for analysis of stock data.



**Figure 2:** Location and extent of the restricted area (K) at Horseshoe Point, currently closed to all fishing activity to protect *Zostera* spp. (seagrass) beds in the Humber Estuary SAC.

Regaining water classification status for the site was not, however, the only obstacle encountered when attempting to open the fishery. The site is within The Humber Estuary Special Area of Conservation and Special Protection Area, part of which is closed to all fishing to protect intertidal 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.

Traditionally, access to this site was from shore using off-road vehicles. Consultation with Natural England raised concerns about adverse impacts this 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 who were opposed to fishers crossing their land. 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 beds were leased by a local landowner. 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 alleviated immediate pressure

to open these beds. The discussions were not furthered, and to date, solutions still need to be agreed and implemented prior to the opening of any future fisheries.

In June 2015, East Lindsey District Council 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 that large numbers of cockles were either dying or had recently died, with 0.3% of the cockles sampled from the area 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 928 tonnes in the previous year to 485 tonnes.

Cockle stocks again declined significantly between the summers of 2015 and 2016, from 485 to 59 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. Despite this decline, the summer of 2017 showed a recovery in stocks, with a total stock of 403 tonnes found in July 2017. Just 13.5 tonnes of the total stock were fishable, with almost 50% of the cockles recorded identified as year-0 spat (Quinn and Jessop, 2017). This report summarises the results of the most recent survey, conducted in August 2018.

## 2. Material and methods

The survey was conducted on foot over the low water period on August 1, 2018. This is consistent with previous summer surveys conducted by Eastern IFCA, that have generally been undertaken around the end of July and beginning of August. The method used for this survey was also consistent with previous surveys.

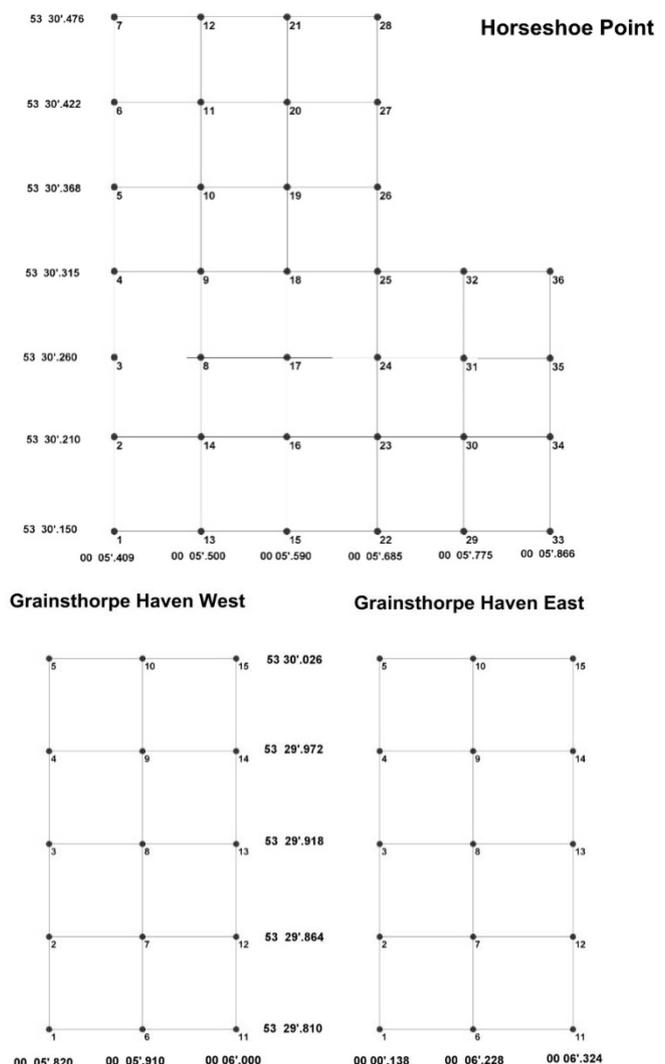
The survey was conducted by taking samples from a predetermined regular grid of sample stations, with each station approximately 100 metres from the next. The positions of these stations are consistent with those used in previous surveys from 2013 to 2017. The Horseshoe Point bed consisted of 36 sampling 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 0.1 m<sup>2</sup> quadrats. All cockles found in the samples were washed and retained in bags, one per station. Each bag was labelled by bed name and station number.

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 millimetre. These were divided into year-class groups that were further sub-divided into two size groups of  $\geq 16$  mm and  $< 16$  mm widths, differentiating those that had attained minimum landing size from those that had not. Each group was then weighed using electronic scales accurate to 0.01 g.

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



**Figure 3:** Positions and station numbers of sampling stations on the Horseshoe Point, Grainthorpe Haven West and East beds

- 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 ≥16 mm cockles and <16 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 on each bed was determined by multiplying mean biomass by bed area.

### 3. Results

Stock summaries for the beds surveyed on August 1, 2018 found a total stock over the three beds of 417 tonnes, including cockles of all sizes. Of this, there was a total fishable stock of just 103 tonnes (Tables 1 - 3).

**Table 1:** Summary of cockle stocks at Horseshoe Point bed on August 1, 2018

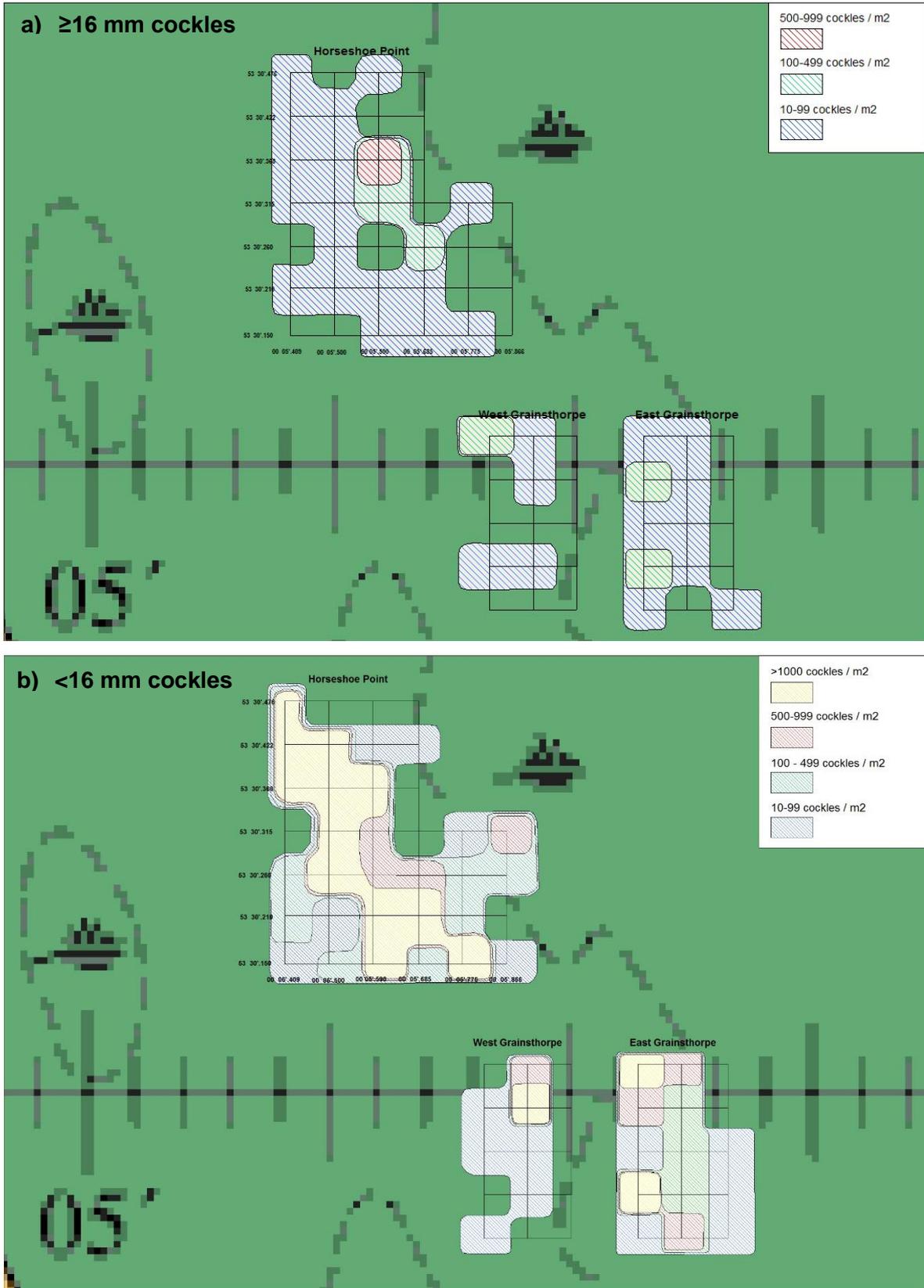
Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m <sup>-2</sup> )	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	20.6	90	3.6	74
<16	28.3	791	8.1	228
Yr-0 Spat	23.9	512	1.3	30

**Table 2:** Summary of cockle stocks at the West Grainthorpe bed on August 1, 2018

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m <sup>-2</sup> )	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	5.4	76	1.7	9
<16	6.9	287	4.1	28
Yr-0 Spat	1.9	235	1.6	3

**Table 3:** Summary of cockle stocks at the East Grainthorpe bed on August 1, 2018

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m <sup>-2</sup> )	Mean Weight (t ha <sup>-1</sup> )	Stock biomass (t)
≥16	9.7	55	2.0	20
<16	12.7	412	4.6	58
Yr-0 Spat	7.5	234	0.4	3

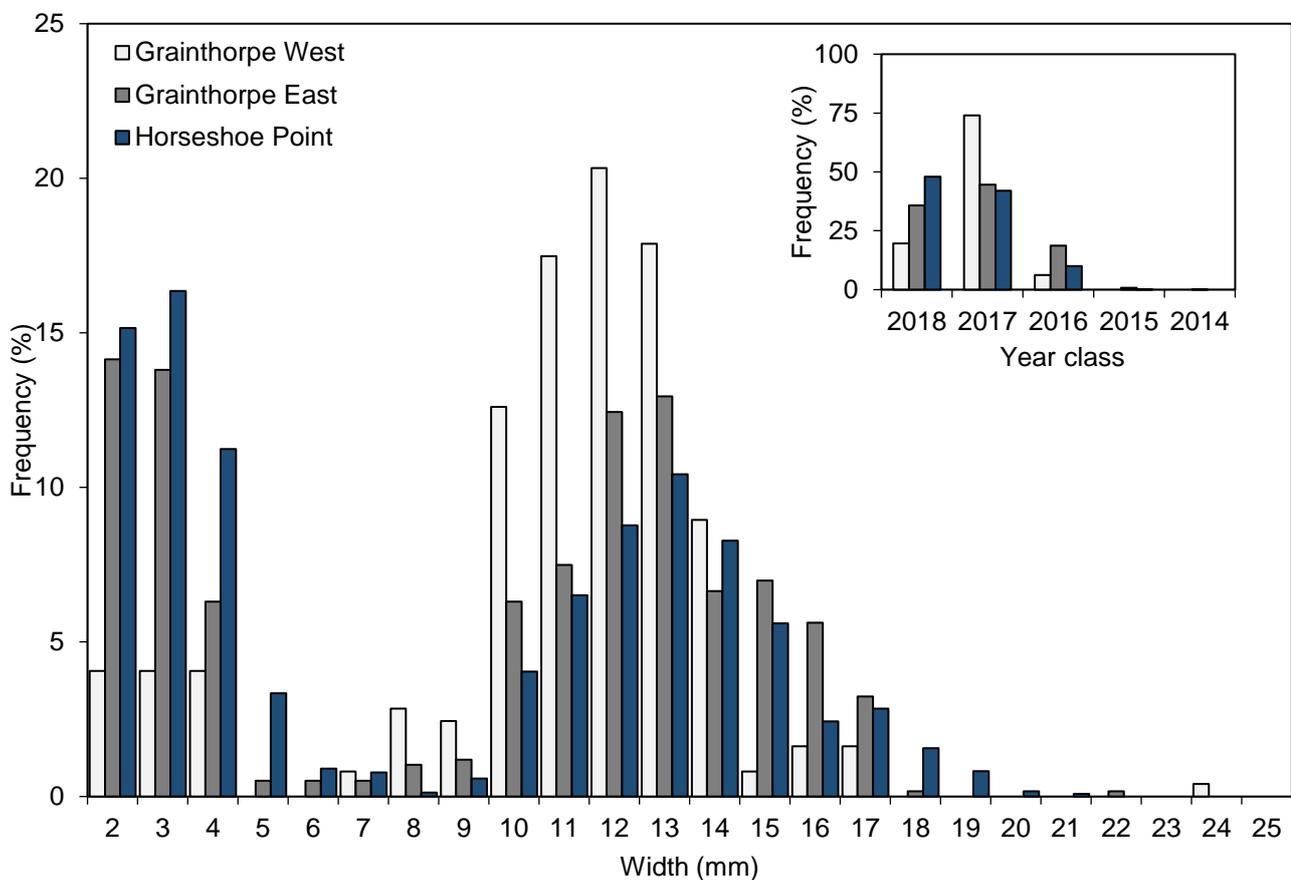


**Figure 4.** Density of cockles  $\geq 16$  mm (top) and  $< 16$  mm (bottom) on the three beds at Horseshoe Point. Chart not to be used for navigation.

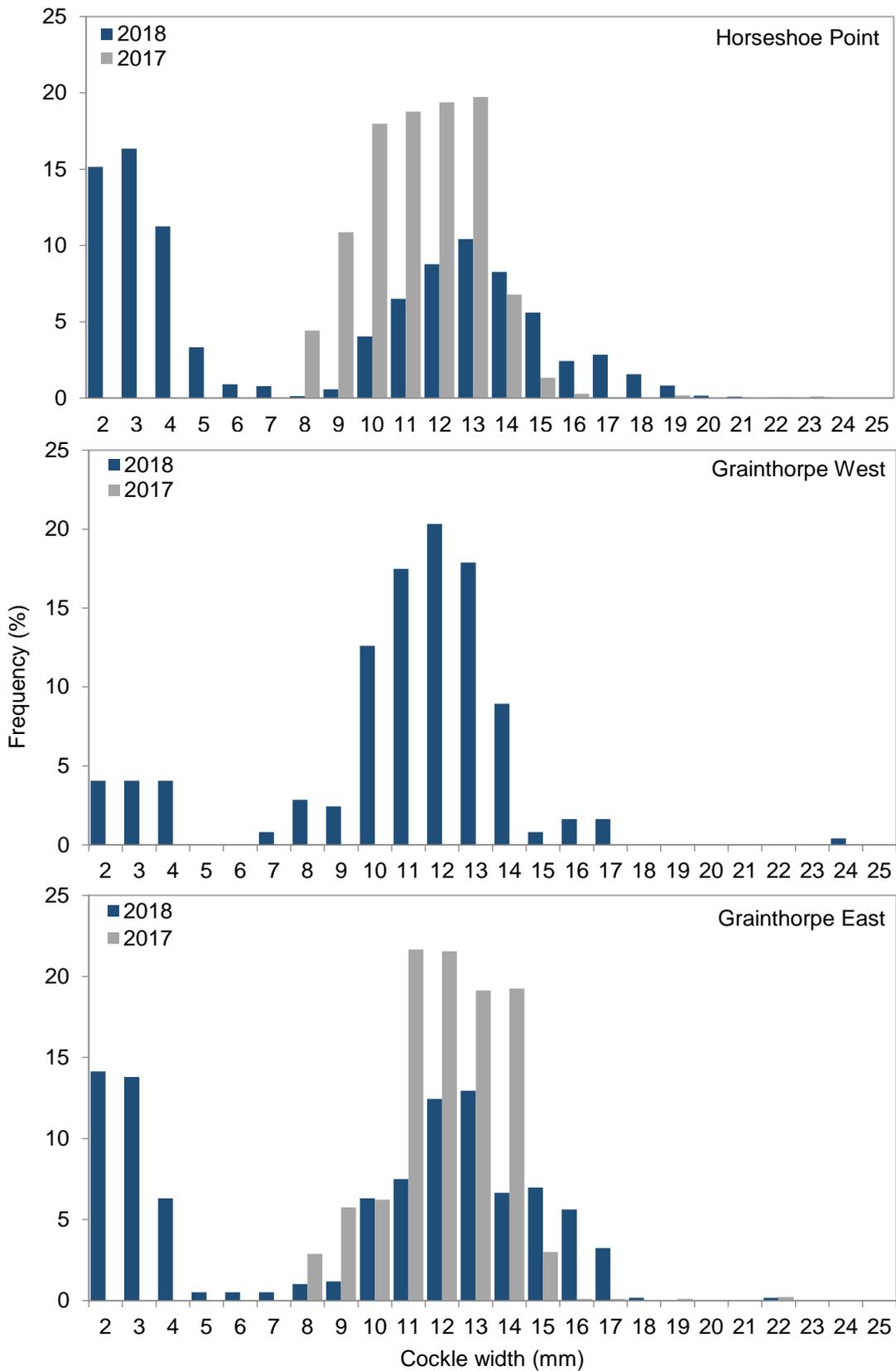
© British Crown and Oceanwise 2018. All rights reserved. Licence no. EK001 – 20180110. This product has been derived in part from material obtained from the UK Hydrographic Office with the permission of the UK Hydrographic Office, Her Majesty's Stationary Office and other relevant authorities.

Where cockles were present, the population had a size distribution predominantly in the 10 mm to 16 mm range, alongside high numbers of year- spat measuring 5 mm or less also found on the Horseshoe Point and East Grainthorpe beds.

The Grainthorpe West and East bed were dominated by 2017 year-class cockles, while the Horseshoe Point bed was dominated by 2018 spat. Depending on the bed, between 6% and 19% of the total number of cockles found in the 2018 stock were aged as from the 2016-year class. A good spatfall was recorded with 36 tonnes of year-0 cockles recorded in total over the three beds. Furthermore, on Horseshoe Point and Grainthorpe East, the two beds where cockles were found in 2017, the 2018 survey has shown a skew to larger sizes compared to 2017, with greater sizes than were found on three beds than in the previous year. As well as the general skew towards larger sizes, a high spatfall was recorded on Horseshoe Point and Grainthorpe East, with a moderate spatfall recorded on Grainthorpe West.



**Figure 5:** Size frequency distribution of cockles found at Horseshoe Point, West Grainthorpe and East Grainthorpe beds. Insert (top right): Proportion of population from each year class.



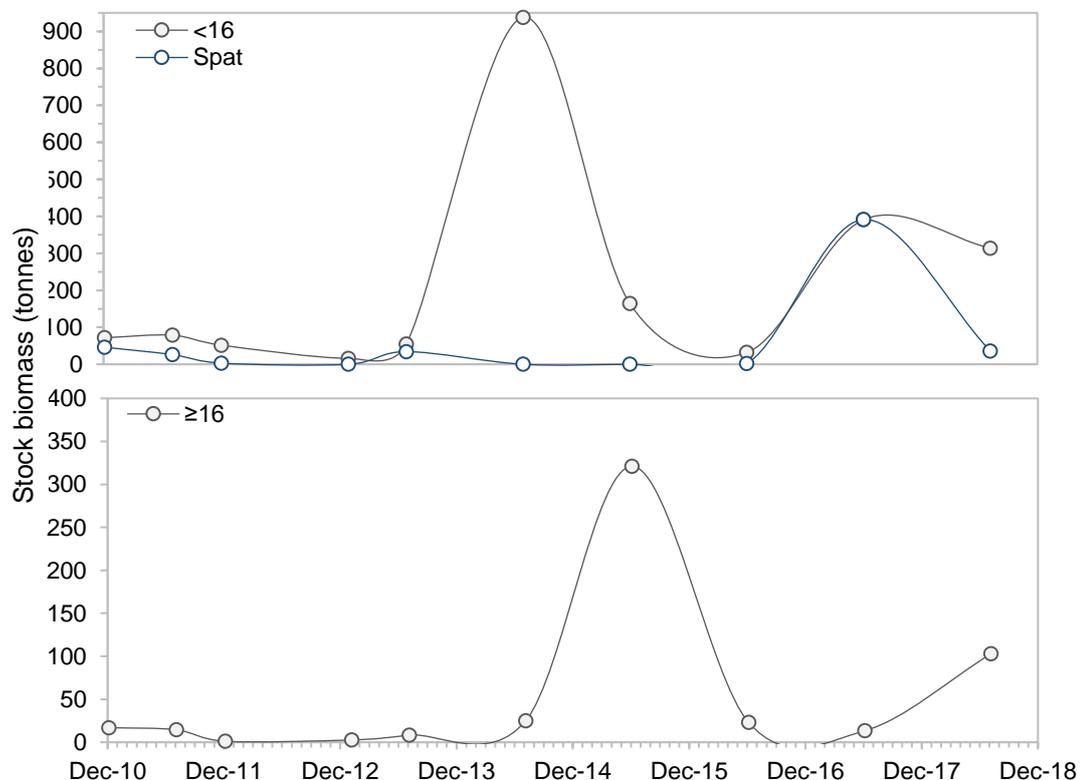
**Figure 6:** Size frequency distribution of cockles surveyed at Horseshoe Point (top), Grainthorpe West (middle) and Grainthorpe East (bottom) in 2018 (dark blue) compared to 2017 (grey).

## 4. Discussion

### 4.1. Potential for a cockle fishery

The 2018 survey continued to show good recovery following on from that seen in 2017, through an increase in the sizeable cockle stock following the major stock decline recorded in 2016. The  $\geq 16$  mm cockle stock recorded in 2018 was the second highest recorded at Horseshoe Point since annual summer surveys began in December 2010. Despite an increase from 14 tonnes to 103 tonnes, however, the 2018 adult cockle stocks on the three beds remain too sparse to support a viable commercial cockle fishery.

The West Grainthorpe bed showed recovery from the significant decline noted in 2017 when no cockles at all were recorded. In 2018, 9 tonnes of sizeable cockles were recorded, along with 28 tonnes of cockles  $< 16$  mm, including 3 tonnes of Yr-0 spat. Many of these cockles were aged as part of the 2016 and 2017 year-class cohorts. The numbers recorded in 2018 were still not high, indicating that the cockles may have been sparse or patchy in distribution. This could explain why cockles that were noted as part of the 2016 and 2017 year-class cohorts in the 2018 survey were not recorded in the 2017 survey - they may simply have been missed in the 2017 survey if quadrats fell outside of small patches of cockles. The West Grainthorpe bed also supports an area of thick dry sand along one edge. If this sand bar is mobile, it may have covered some of the cockles in 2017.



**Figure 7:** Total stock biomass over the three beds at Horseshoe Point of each size class (top: Year-0 spat and  $< 16$  mm, bottom:  $\geq 16$  mm) from 2010 to 2018. Please note the vertical axis scale for stock biomass differs between figures.

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

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. To make this feasible, however, the byelaw that currently limits the daily exploitation rate to 500 kg per person would need to be changed.

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

The fishing restriction, closed to protect intertidal seagrass beds, 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.

##### **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.

##### **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 causal factor for these mortalities has been formally attributed in either location, but are possibly linked to high infestations of *Haplosporidian* parasites that have been identified in samples collected from The Wash.

The 2018 survey data returned no evidence of atypical mortality and continued to show good recovery from the major stock decline witnessed between July 2015 and 2016 (Figure 7). There was an 89.5-tonne increase in cockles measuring  $\geq 16$  mm recorded between 2017 and 2018. Together, the three beds supported the second largest sizeable cockle stock since Eastern IFCA began surveying the beds in December 2010.

## 5. References

Jessop, R.W. 2015. Eastern IFCA Research Report - Horseshoe Point Stock Assessment 2015.

Jessop, R.W. 2016. Horseshoe Point Cockle Stock Assessment. Eastern IFCA Research Report 2016. Jessop, R.W., Akesson, O., and Smith, L.M. 2012. Eastern IFCA Annual Research Report Research Report 2012.

Jessop, R.W. and Maxwell, E. 2011. Eastern IFCA Annual Research Report 2011.

Jessop, R.W., Strigner, R., Thompson, S. and Welby, P.R. 2013. Eastern IFCA Annual Research Report 2013.

MacDonald, M. 2008. Pilot Shellfish Fisheries Strategic Environmental Assessment. Environmental Report. North Eastern Sea Fisheries Committee.

NESFC, 2004. Fisheries and Environmental Monitoring Summary Report 2003/2004. North Eastern Sea Fisheries Committee.

NESFC, 2005. Cockle Final Report 2005. North Eastern Sea Fisheries Committee.

NESFC, 2006. Cockle Final Report 2006. North Eastern Sea Fisheries Committee.

Quinn, E.S. and Jessop, R.W. 2017. Horseshoe Point Cockle Stock Assessment. Eastern IFCA Research Report 2017.

Strigner, R. 2014. Horseshoe Point Cockle Stock Assessment. Eastern IFCA Research Report 2014.