Horseshoe Point Cockle Stock Assessment and Review of Challenges Associated With Opening a Fishery

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Eastern IFCA Research Report

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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, Grainsthorpe Haven West and Grainsthorpe Haven East (Figure 1).

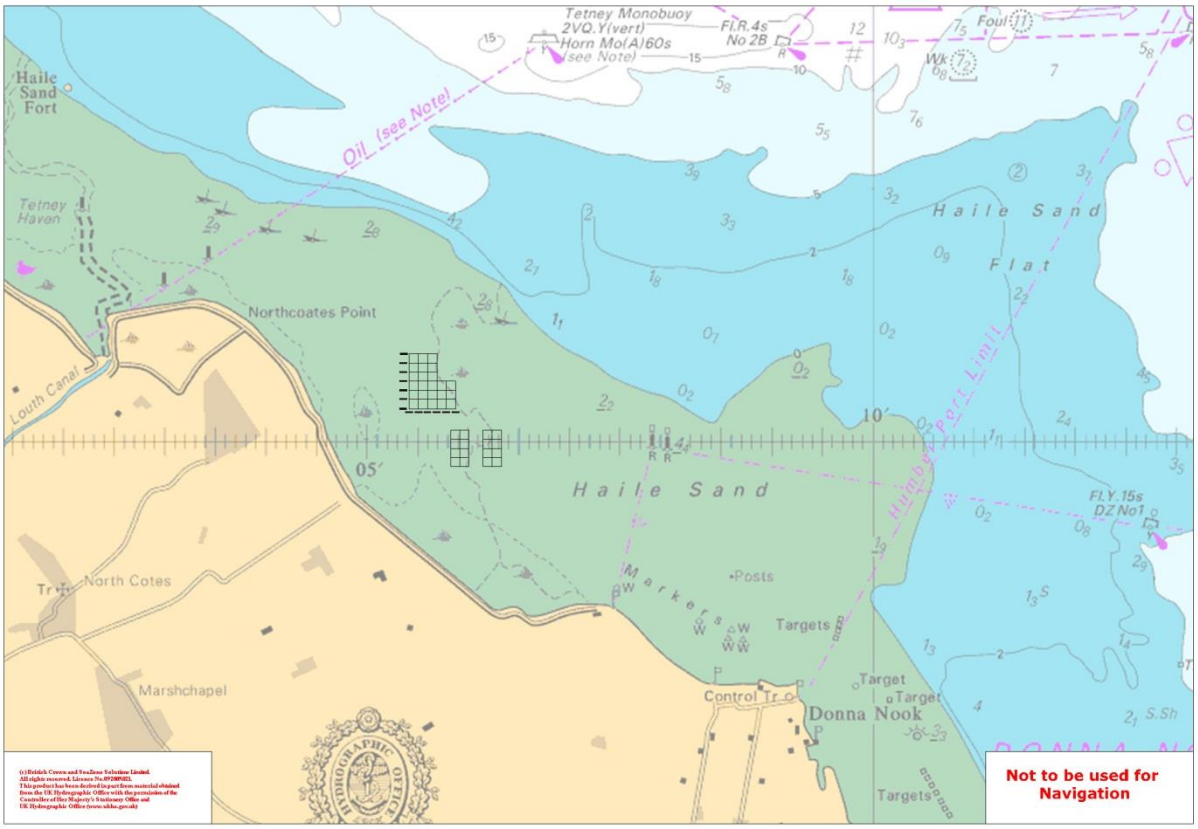

Figure 1: Location of Horseshoe Point cockle beds (Horseshoe Point, Grainthorpe Haven West and Grainsthorpe Haven East) on Haile Sand.

Historically, these beds supported small but valuable fisheries, attracting fishermen 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 eleven stock surveys to date (January and August 2011, January 2012, February and August 2013, August 2014, July 2015, July 2016, July 2017, August 2018 and July 2019) (Jessop *et al*., 2011; Jessop *et al*., 2012; Strigner, 2014; Jessop, 2015 and Jessop, 2016; Quinn and Jessop, 2017, Quinn, 2018). Following the 2019 survey, the Covid-19 pandemic interrupted the annual survey regime until work patterns normalised, allowing the most recent 2023 survey. These surveys have shown a fluctuation in stocks similar to those that were recorded previously by NESFC. Between 2010 and 2012 moderate spatfalls were recorded, but most of these cockles died during the following summer before reaching 16mm minimum landing size[1], producing stocks that varied between 12 and 105 tonnes. Another moderate settlement in 2013 fared better and their survival resulted in a stock of 928 tonnes by August 2014. Eastern-IFCA planned to open these stocks in March 2015 but several issues (including obtaining water classification and access to the beds) prevented the fishery from being opened before these cockles died. Following this peak in stock biomass, there was a good settlement in 2017 that resulted in a stock of 417 tonnes in 2018, but this had died by the following summer, replaced by 90 tonnes from the 2018 year-class cohort.

The survey data from 2010 onwards show the fluctuating stock levels are due a short longevity of the cockles at the site, which tend to suffer high mortalities within 12-18 months of settling. High numbers of unburied moribund cockles have also been observed during warm weather periods, which suggests the cockles at this site are suffering similar “atypical” mortality to that observed in The Wash since 2008 and the Burry Inlet since 2004. This was first noted by ESFJC officers in 2010, prior to taking over the management of the site in 2011 but the fluctuating stocks recorded prior to this by NESFC suggest it may have been occurring for longer. Cefas, who have been studying the mortalities in The Wash since 2021 and have attributed those die-offs to a novel *Marteilia* parasite, also included Horseshoe Point in their 2023 sampling regime to determine if there is a similar causal agent. Results from that study are still awaited.

[1]The Eastern IFCA Byelaw XXIV: Humber Estuary Cockles Fishery Byelaw defines the Minimum Landing Size for cockles at Horseshoe Point as: “*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.

Method

The survey was conducted on foot over the low water period on May 23rd, 2023. This was slightly earlier than the previous summer surveys conducted by Eastern IFCA, which have generally been undertaken around the end of July or the beginning of August.

Although the survey was conducted earlier than usual, the sampling method was consistent with previous surveys. This involved collecting samples from a predetermined regular grid of sample stations, in which stations were approximately 100 metres apart. The same stations have been used since 2013 for these surveys. Prior to then the spatial extent of the surveys was slightly smaller but the stations were closer together. The Horseshoe Point bed consisted of 36 sampling stations, while Grainthorpe Haven West and East consisted of 15 sampling stations each (see figures 2 and 3). Hand-held GPS units were used to locate the position of the stations in the field.

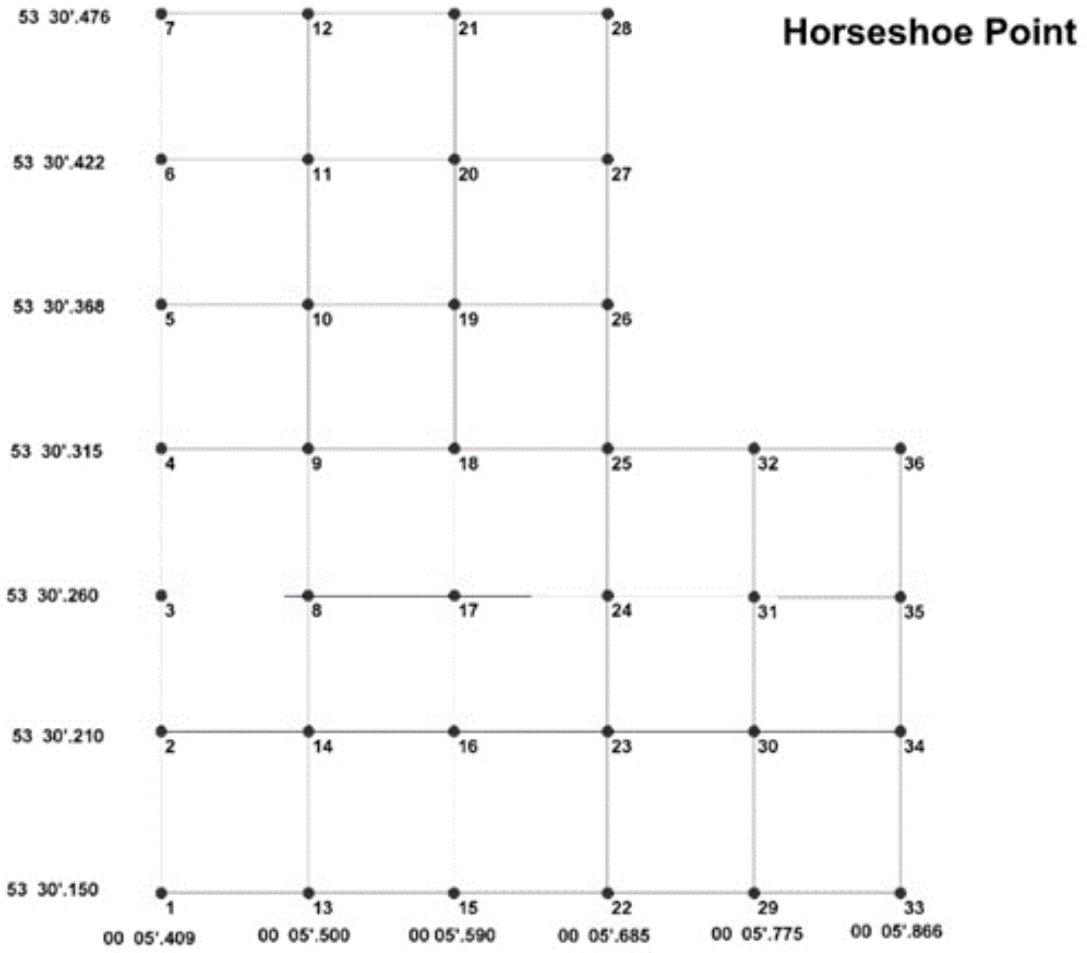

Figure 2 – Positions of sample stations surveyed at the Horseshoe Point bed

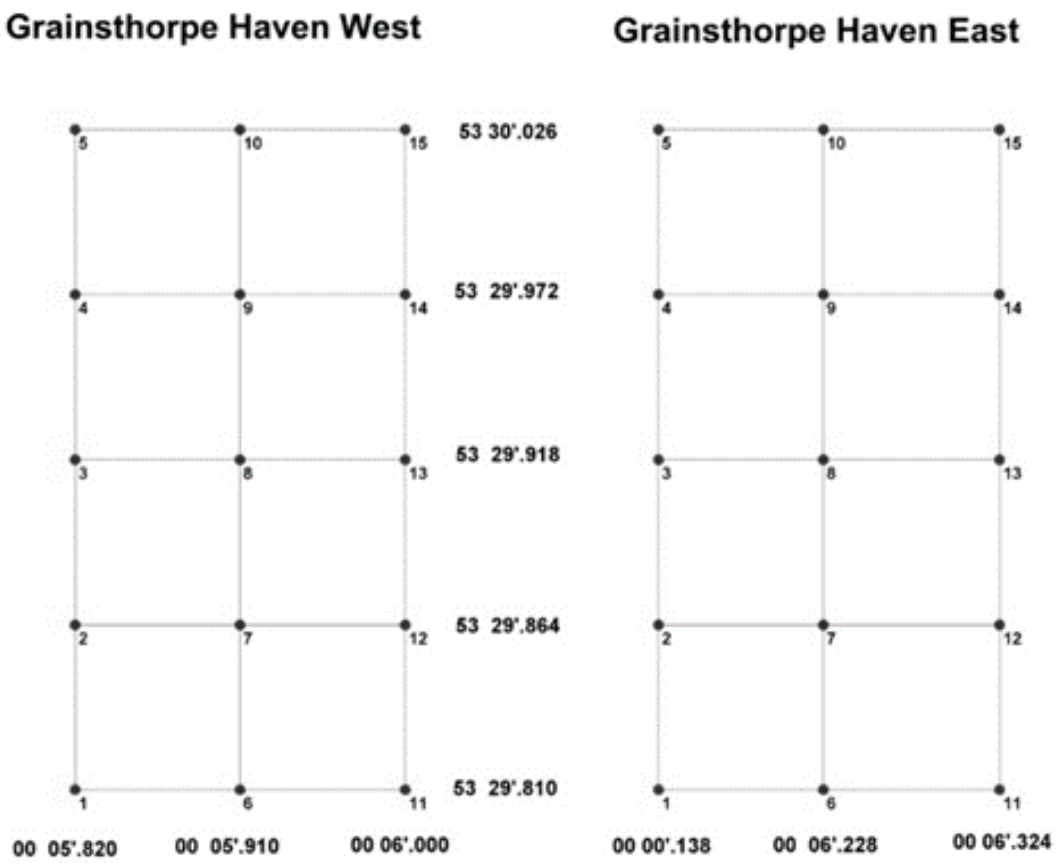

Figure 3 – Positions of sample stations surveyed at the Grainsthorpe beds

Samples were collected by sieving the sediment taken from 0.1 m^2 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 ≥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 entered into Microsoft Excel and transferred from to MapInfo to produce interpolated density models around the data points. Separate layers were created to display the following cockle densities:

- 10 – 99 cockles/m^2
- 100 – 499 cockles/m^2
- 500 – 999 cockles/m^2
- ≥1,000 cockles/m^2

For the 10 - 99 cockles/m^2 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. Separate layers were drawn to show the extent of ≥16 mm cockles and <16 mm cockles.

The 10 - 99 cockles/m^2 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.

Results

At the time of the survey, the cockle stocks on these beds were found to be:

- ≥16mm width – 309 tonnes
- <16mm width – 132 tonnes
- **Total stock – 441 tonnes**

More details of these results are summarised in tables1-3, while figures 4 and 5 show the distribution of the ≥16mm and <16mm width cockles on the three beds..

Table 1: Summary of cockle stocks at Horseshoe Point bed on May 23, 2023

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m^{-2})	Mean Weight (t ha^{-1})	Stock biomass (t)
≥16	25.9	2757	8.3	215
<16	25.0	268	2.8	71
Yr-0 Spat	0.0	0	0.0	0

Table 2: Summary of cockle stocks at the West Grainthorpe bed on May 23, 2023

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m^{-2})	Mean Weight (t ha^{-1})	Stock biomass (t)
≥16	6.8	1613	4.9	34
<16	7.4	4700	4.9	36
Yr-0 Spat	0.0	0	0.0	0

Table 3: Summary of cockle stocks at the East Grainthorpe bed on May 23, 2023

Cockle Width (mm)	Bed Area (ha)	Mean Density (cockles m^{-2})	Mean Weight (t ha^{-1})	Stock biomass (t)
≥16	7.1	2475	8.4	60
<16	9.8	2070	2.6	25
Yr-0 Spat	0.0	0	0.0	0

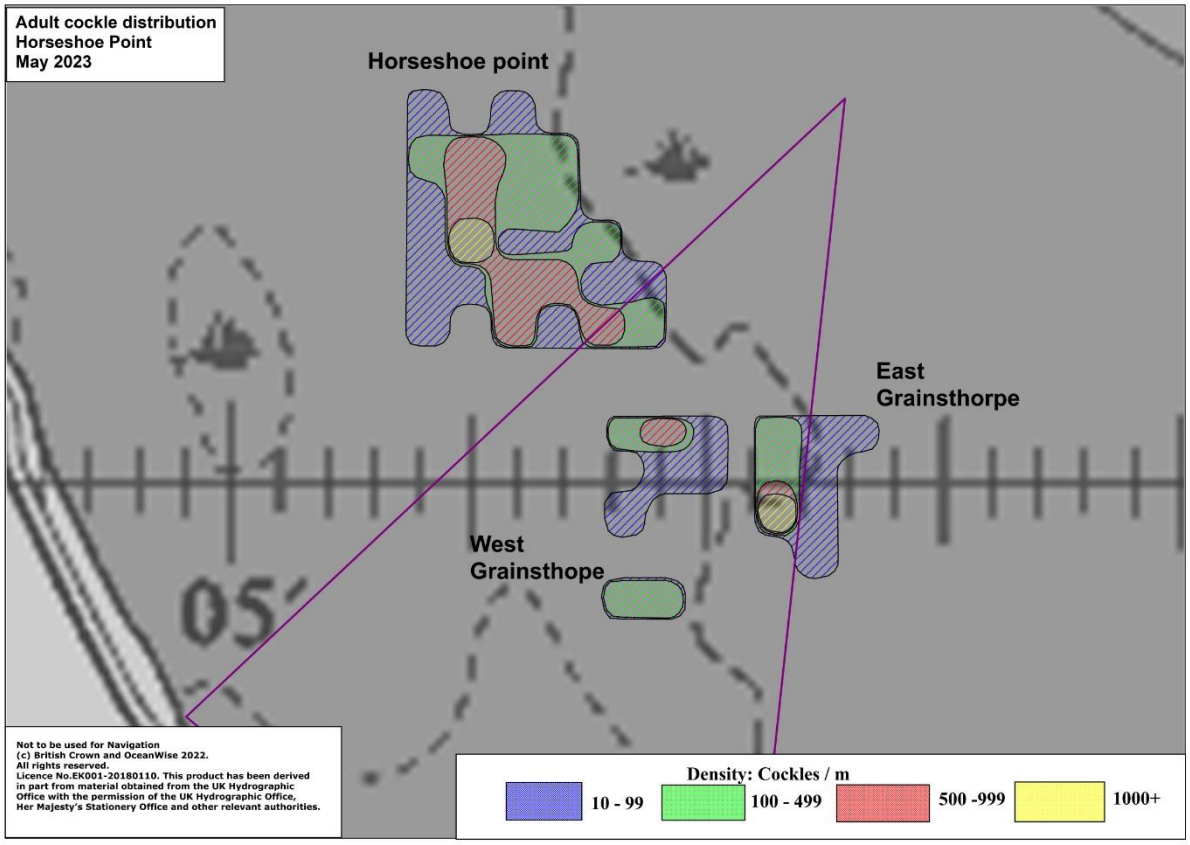

Figure 4 – Distribution of ≥16mm width cockles at the Horseshoe Point and Grainsthorpe beds – May 2023. Area within purple triangle closed to protect eelgrass.

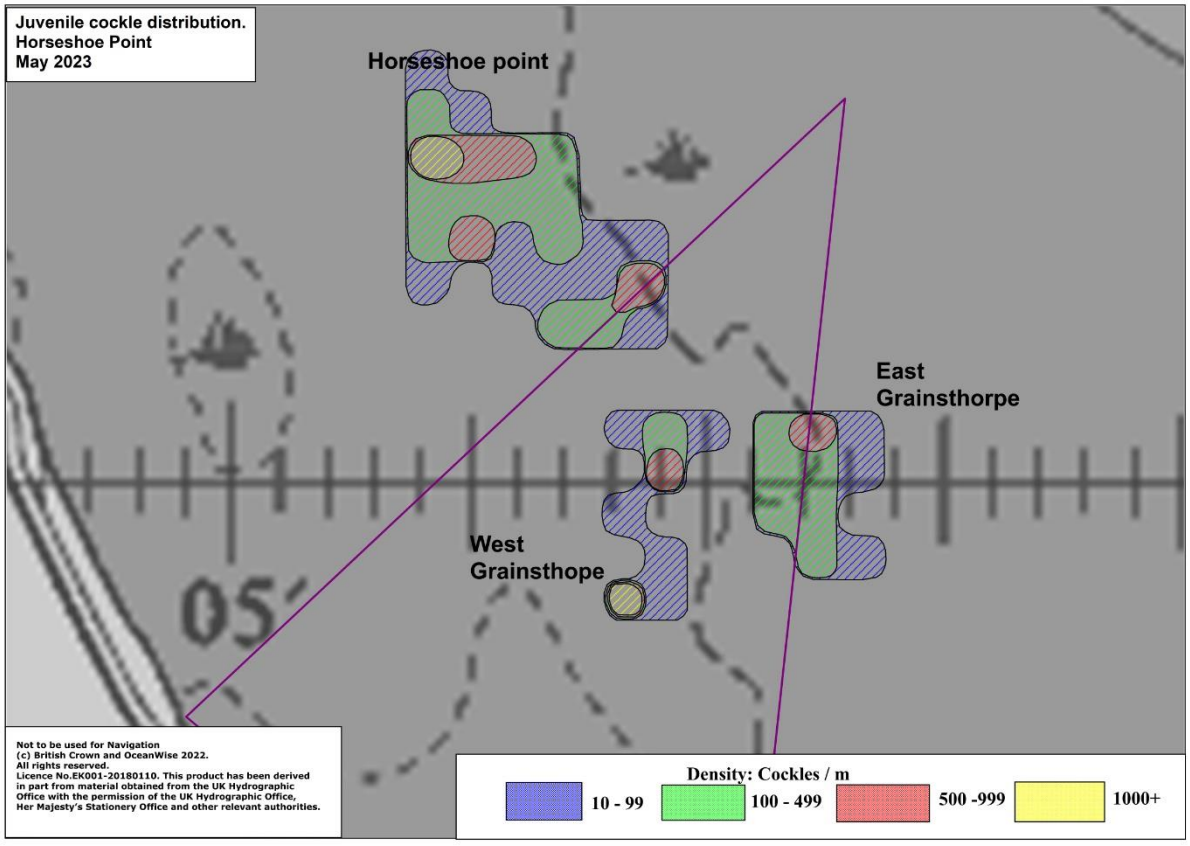

Figure 5 – Distribution of <16mm width cockles at the Horseshoe Point and Grainsthorpe beds – May 2023. Area within purple triangle closed to protect eelgrass.

Figures 6 to 8 show the size and age frequencies of the cockles found on the three beds. These show in terms of cockle numbers, the stocks are dominated by individuals from the 2021 and 2022 year-class cohorts. Those from the 2022 cohort mostly have a size range of 6mm to 12mm width, while those from the 2021 cohort are mostly between 13mm and 20mm width. No 2023 (Year-0) cockles were found during these surveys, but as settlement usually occurs in July, the survey would have been too early to detect signs of this year's settlement. Only three cockles were found within the samples that were older than these two cohorts.

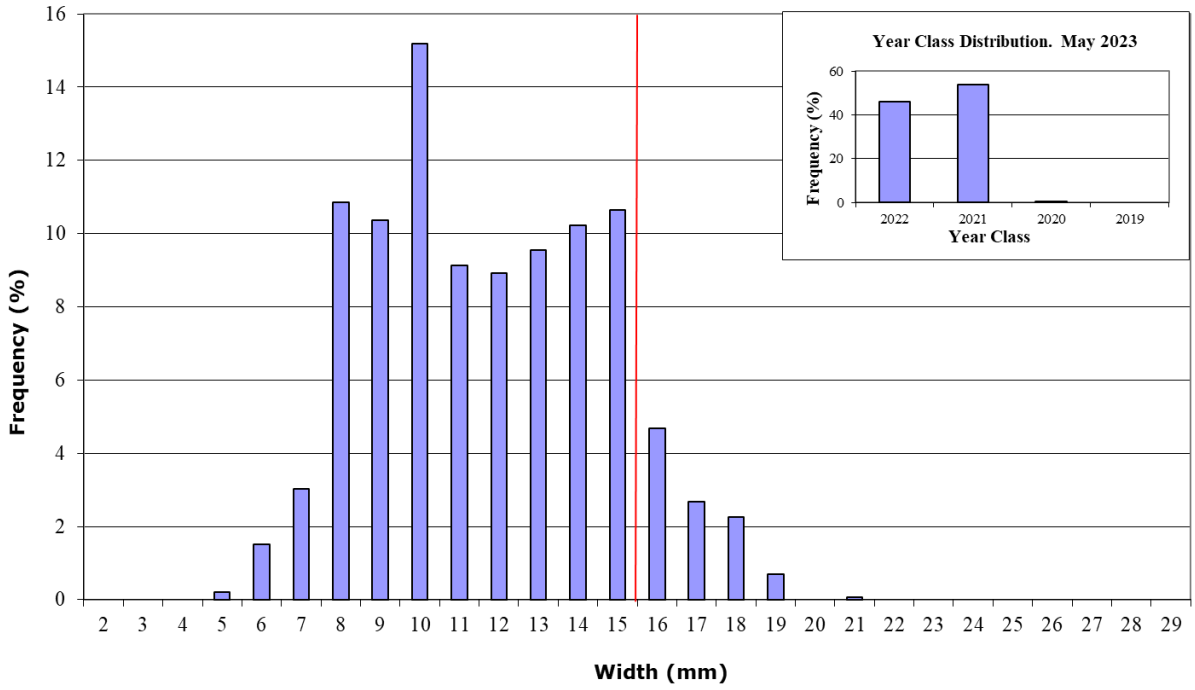

Figure 6 – Cockle size and age frequency on Horseshoe Point – May 2023

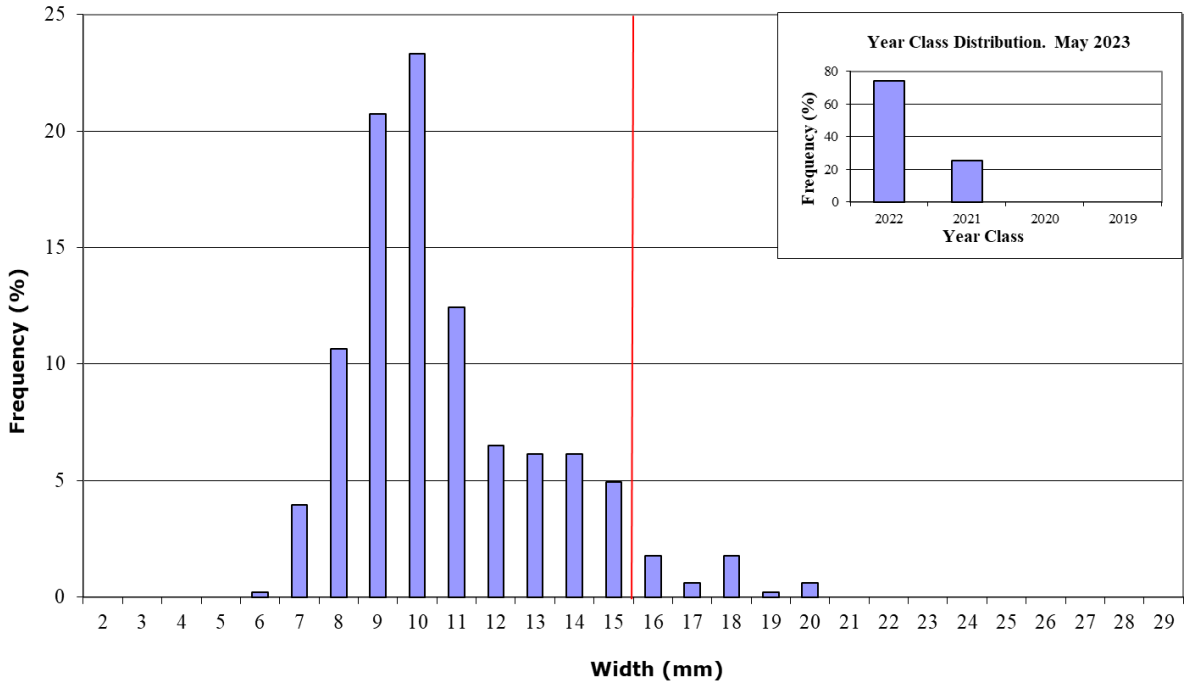

Figure 7 – Cockle size and age frequency on West Grainsthorpe – May 2023

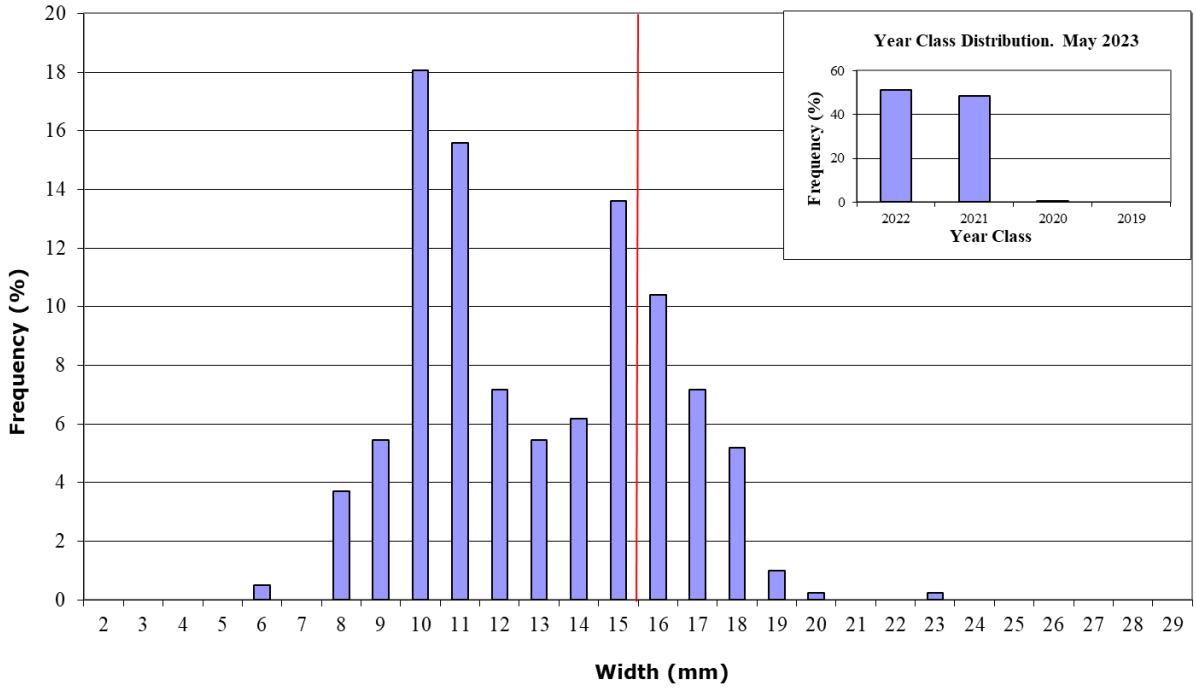

Figure 8 – Cockle size and age frequency on East Grainsthorpe – May 2023

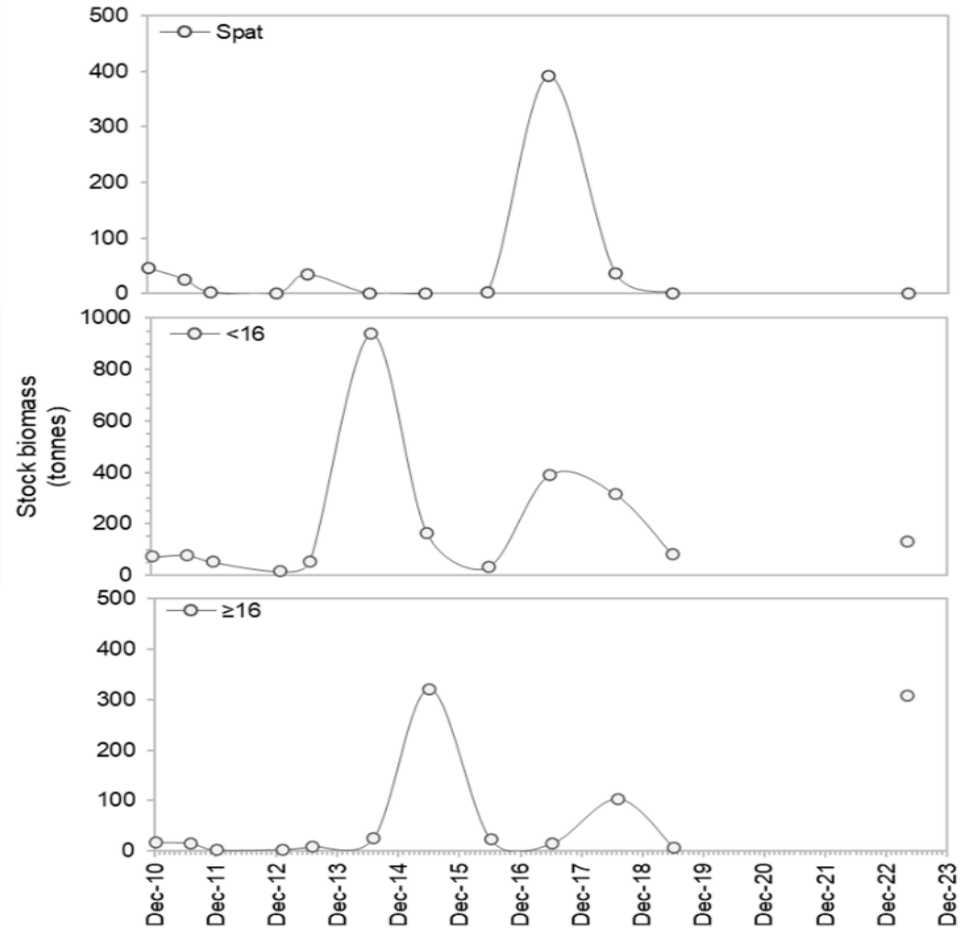

Figure 9 – Cockle stock biomass over the three beds at Horseshoe Point of each size class (top: Year-0 spat and <16 mm, bottom: ≥16 mm) from 2010 to 2023. Note the vertical axis scale for stock biomass differs between figures.

Discussion

Although historically the Horseshoe Point beds supported a regular, small-scale hand-worked cockle fishery, they have remained closed since 2002. Initially, these were closed by NESFC to facilitate the recovery of the then poor stock levels. Sufficient recovery did not occur until 2014, however, by which time the jurisdiction of the site had transferred to Eastern-IFCA. Figure 9 shows the stock biomass found on the beds during the surveys conducted between 2010 and 2023. This shows stocks remained low until 2014 when the abundance of <14mm width cockles peaked at over 900 tonnes. Although the majority of these were smaller than the minimum landing size, Eastern-IFCA planned to open the fishery as soon as the bulk of the stock achieved the MLS. There were a number of difficulties that were encountered, however, that together prevented that fishery from being opened. Before these challenges could be overcome, the bulk of the fishable stock died. There was a further settlement that would have supported a small fishery in 2018, but the issues that had confounded the 2014-15 fishery had not been overcome in the interim, so this was not pursued. The recent May 2023 survey also identified sufficient stocks for a fishery, but as high levels of mortality were witnessed on this bed in June, it is likely they will die before the challenges facing this fishery can be overcome and a fishery opened.

The challenges associated with this fishery are described below.

Water classification for a Shellfish Production Area

All areas in which shellfish are harvested commercially must be classified as hygienically safe by the Food Standards Agency. Maintaining this classification requires monthly sampling by the Local District Council, in this case East Lyndsey. Due to previous low stock levels and the absence of a regular fishery, the required sampling regime had stopped in 2004. When jurisdiction for the site was transferred to Eastern-IFCA in 2011, East Lindsey District Council were approached to recommence sampling. However, stock levels were too low at the time to find sufficient sample material, so with little prospect of further fisheries due to high annual die-offs, no further attempts were made to reinstate the sampling regime until the stocks were found to have recovered in 2014. East Lindsey District Council were again approached to commence sampling in August 2014. The protocol for gaining classification requires a sanitary survey to be conducted and 10 samples to be collected at least 2 weeks apart; a process that takes a minimum of 16 weeks. In April 2015, after sufficient samples had been tested, the beds were given a Class A water classification. Unfortunately, this only gave a small window in which the beds could be harvested prior to the closed season in May (see below for Byelaw).

Although the site had gained Class A water classification, other challenges emerged that prevented the fishery from being opened in 2015. Before these could be resolved, the cockles again died. Despite low stock levels, East Lindsey District Council continued the monthly sampling to maintain the water classification until May 2016. Scarcity of cockles at the site following die-offs made sampling difficult, however, so the site was put on a declassified list that only required quarterly rather than monthly sampling to be maintained. Because there were no fishing opportunities and the

sampling was becoming increasingly difficult, in February 2017 further sampling was postponed and the bed was placed on a non-monitored list. Such beds can remain on a non-monitored list for up to two years. If monthly sampling recommences during that period, a Class B classification can be given but if sampling does not recommence during that period, the classification will be lost. Thereafter, regaining a new classification will require starting a new sampling process from the beginning. Because of the cost associated with sampling and the absence of a fishery, East Lindsey District Council announced they could only justify the time and resource to restart sampling again if the fishermen produced a document confirming their access plan for the fishery. This was not forthcoming, so no further sampling was conducted and the site was declassified in 2019.

Because of the length of time that has elapsed since the site was last classified, the process required to regain the classification would need to commence from the beginning. This would require:

- The applicant (usually the harvester, but could be Eastern-IFCA on behalf of the harvesters) to apply to the Food Standards Agency for classification of the production area by completing an online production or relay area application form (https://www.food.gov.uk/business-guidance/shellfish-classification#application-process). This form needs to be signed off by the local authority responsible for delivery of food controls (in this case, East Lyndsey District Council).
- 10 samples must be collected at least 2 weeks apart.

Because the site has been included within a previous sanitary survey, a new sanitary would not be required.

Accessing the site

Traditionally, access to the cockle beds has been from shore, using off-road vehicles to traverse the saltmarsh from the Horseshoe Point car park. Because the site is within The Humber Estuary Special Area of Conservation and Special Protection Area, however, Natural England have previously raised concerns about the adverse impact this activity 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 industry's 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 fishermen crossing their land. An option of laying a temporary metallic road across the marsh, thus avoiding the land owned by the group, was explored. At that time, the installation of such a track was estimated to cost £6-7,000. Further to the installation of a roadway, a guarantee was also required that should any damage be caused to the site, it would need to be rectified and that prior to any activities occurring, someone would need to accept liability for such damage.

Protecting the conservation features of the site was not the only challenge associated with accessing the cockle beds. During the consultation between Natural England and the industry representatives, it was identified that the car park and marshes leading to

the beds were part of a freehold property owned by the University of Oxford of Merton College who leased the land to a local farmer. 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, the landowner suggested he would allow access to the cockle beds across his land, but this would require financial recompense from the fishermen. During the 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 mentioned above. The landowner was unwilling to accept these liabilities himself. The industry were also reluctant in case they became liable for damages caused by other third parties who started using the road. Before agreement could be found, the opening of the 2015 Wash cockle fishery alleviated immediate pressure to open these beds and the discussions were not furthered. To date, solutions still need to be agreed and implemented prior to the opening of any future fisheries.

Due to the difficulties associated with accessing the cockle beds from shore, there has been some discussion about the potential to access the beds from sea using boats. While this would negate the concerns regarding damage to the saltmarsh and recompense to the landowner, it does present its own challenges. The fishermen most likely to target the fishery are based in Boston and King's Lynn. This would require a lengthy steam to the site and the necessity to operate out of Grimsby. To make such a venture cost-effective, catches would need to be relatively high. However, the fishery is currently regulated through the Eastern-IFCA byelaw XXIV:- Humber Estuary Cockle Fisheries Byelaw, which restricts catch rates to 500 kg per person each day. At this level of exploitation, to still be cost-effective, a vessel would potentially need to carry more fishermen on board than would be safe. Haile Sand can also be hazardous for navigation and for vessels drying out, with several deep creeks crossing the sand and low sandy dunes creating shallows. Nevertheless, a vessel-operated fishery might be the only option for targeting this fishery.

Seagrass closure

While not as extensive as nearby sites near Spurn Point, Haile Sand has historically supported several small patches of Seagrass (*Zostera*) beds. These were protected from bottom towed gear and 'handwork' fishing activity by the Marine Protected Areas 2016 byelaw and the Marine Protected Areas 2018 byelaw which succeeded it. The extent of the closure can be seen in figure 10. As can be seen in figures 4 and 5, the closed area includes all of the West Grainsthorpe cockle bed and part of the East Grainsthorpe and Horseshoe Point beds. Harvesting cockles is prohibited within the extent of this closure.

Surveys of the seagrass beds have shown its recent extent to be much smaller than the extent of the closure. The size of the closure will, therefore, be reduced in the next iteration of the current byelaw.

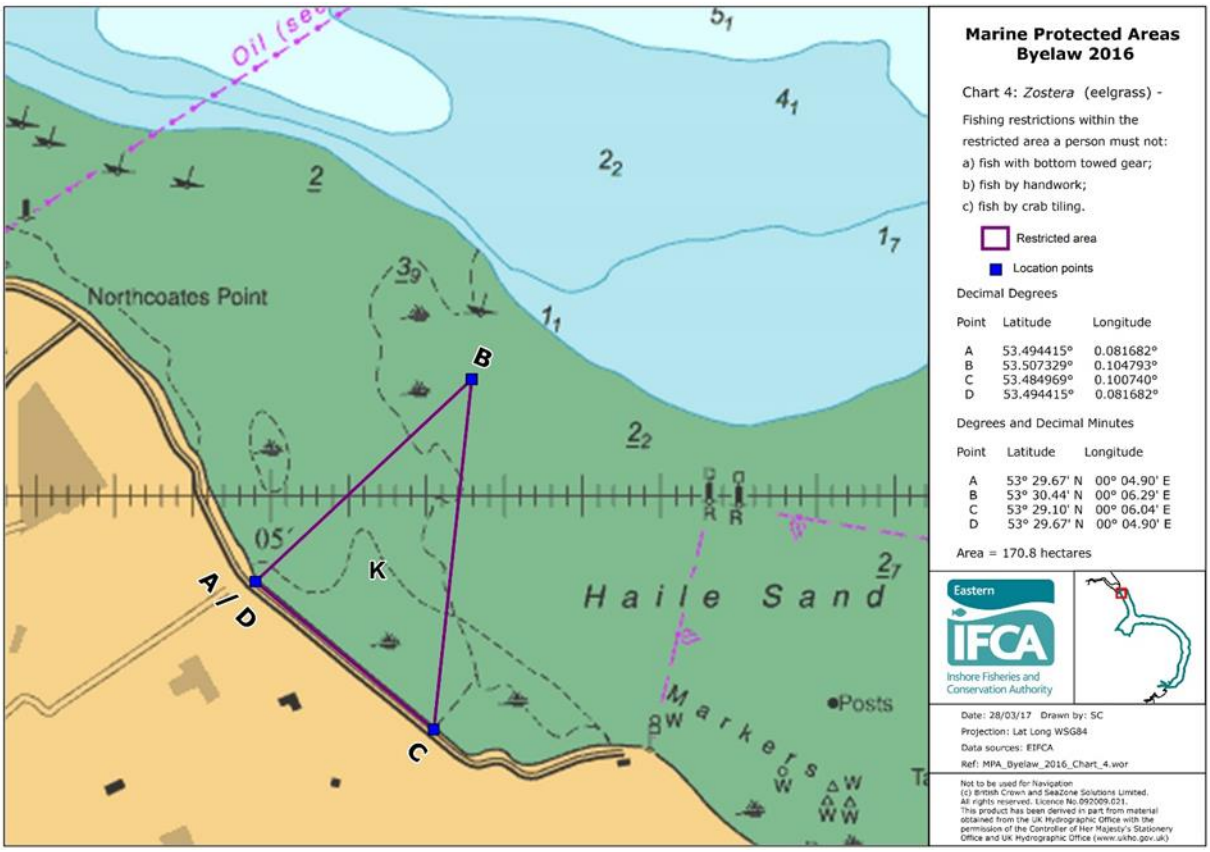

Figure 10 – Chart showing the area of Haile Sand closed to protect eelgrass

Cockle mortality

As has been mentioned previously in this report, the cockles at Horseshoe Point have been suffering unusually high levels of mortality since at least 2010. Similar to the situation in The Wash, these are characterised by gaping, moribund cockles laying on the surface during warm summer months. At Horseshoe Point this mostly affects cockles in their second summer as they reach maturity, greatly reducing the number that reach the Minimum Landing Size. Because the fishery is closed between 1st of May and the 31st August, the majority die during the closed period and only a small window is left during which surviving sizeable cockles can be targeted by a fishery.

Cefas have recently attributed the mortalities in The Wash to a *Martelia* parasite. Samples were collected from Horseshoe Point in June 2023 to determine if the cause of the mortalities is similar.

Byelaw XXIV:- Humber Estuary Cockle Fisheries Byelaw

The cockle beds are currently protected by the Eastern-IFCA Byelaw XXIV:- Humber Estuary Cockle Fisheries Byelaw. In addition to controlling the issuing of permits for this fishery, the byelaw has the following restrictions on fishing activities:

- No person shall remove from the fishery any cockle between the 1st of May and the 31st August inclusive.

- No person shall use for the purpose of taking cockles any instrument other than a rake or other like instrument with a head width not exceeding 305 mm and having spaces of not less than 20 mm between the teeth.
- 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.
- No person shall remove more than 500 kilograms of cockles in any twenty-four hour period, except in accordance with the prior written authority of the Clerk.

This byelaw was originally developed by NESFC to manage a small-scale, hand-worked cockle fishery that was accessed from land. The technical measures within it, aim to sustain the stocks by protecting juvenile cockles, limiting exploitation and closing the fishery during spawning and settlement periods. While these are sensible measures for the fishery that they were introduced to protect, they were written prior to the widespread “atypical” mortalities becoming a large issue. As is the case in The Wash, more cockles are lost through these die-offs than through fisheries, affecting the way the fishery needs to be managed if it is to be effectively exploited. At present, the combination of the closed season and Minimum Landing Size in conjunction with the mortalities mean the majority of the cockles do not reach MLS until the start of the closed season in May, but then die before the fishery opens in September. For a fishery to be effectively harvested on this site, either the Minimum Landing Size needs to be revoked or lessened to allow smaller cockles to be harvested prior to the closed season, or the closed season needs to be adjusted to allow sizeable cockles to be fished before they die during the closed period.

While adjusting the MLS and/or the closed season period would facilitate cockles being fished before they died, it would not help with the current access issues. As discussed above, one solution around the access issues would be to access the beds from sea using a boat. However, the current daily quota of 500kg/day/person means this could be financially unviable without putting more crew aboard vessels. To facilitate a vessel-accessed fishery, it would be better to change the byelaw so there was also provision for a daily vessel quota.

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