

Thames Estuary Cockle Survey Report 2020



Inshore Fisheries and
Conservation Authority

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Executive Summary

This report gives an annual up-date assessment of all cockle stock surveys carried out by the Kent and Essex Inshore Fisheries & Conservation Authority (KEIFCA) during 2020. The data from these surveys are added to the previous annual surveys to provide current information which is used to assess the management strategy of the district's commercial cockle stocks.

NOT TO BE QUOTED WITHOUT PRIOR REFERENCE TO KEIFCA

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1 INTRODUCTION

This report presents the results of the 2020 annual surveys in Thames Estuary to provide data used to inform sustainable management of the cockle (*Cerastoderma edule*) fishery.

The Thames Estuary supports an important cockle fishery, and the commercial harvesting of the cockles is regulated by KEIFCA under the Thames Estuary Cockle Fishery Order, 1994 (TECFO) and relevant byelaws. The Authority has conducted annual surveys of the cockle beds within the Thames Estuary since 1988 to provide robust data to inform sustainable management of the cockle (*Cerastoderma edule*) fishery.

The annual cockle surveys are critical in providing information to open the TECFO and Outside cockle fisheries, and to set their annual Total Allowable Catch (TAC) limits. That allows for a sustainable fishery to operate. The sustainable management of the cockle stocks also provides important information for environmental management, such as continued adequate food for wading birds and marine species, within the numerous Marine Protected Areas (MPAs) within which the fishery operates. The management controls the exploitation of the cockle population to ensure that there is not any significant adverse impact upon the features of the Essex Estuaries SAC along with the Mid Essex Coast and Outer Thames Estuary SPA sites.

The cockle survey programme was designed to allow for assessing annual and seasonal trends in cockle stocks within the major commercial harvesting areas of the Thames Estuary. The annual surveys take place on known cockle beds in the Thames Estuary, which were divided into cockle management areas (Figure 1) within which stocks and fishing activity are assessed annually.

The results of the stock assessment surveys were used to examine the distribution, density and age structure of cockles in the different areas, and to produce estimated values of population size and biomass. The results from the preceding autumn survey, together with the results from the following spring survey are analysed and evaluated within the context of the long-term trend to inform setting the total allowable catch (TAC) for the commercial fishing sector. The TAC for the fishery which was divided between licence holders (for areas inside the TECFO area) or permit holders (for areas outside the TECFO area).

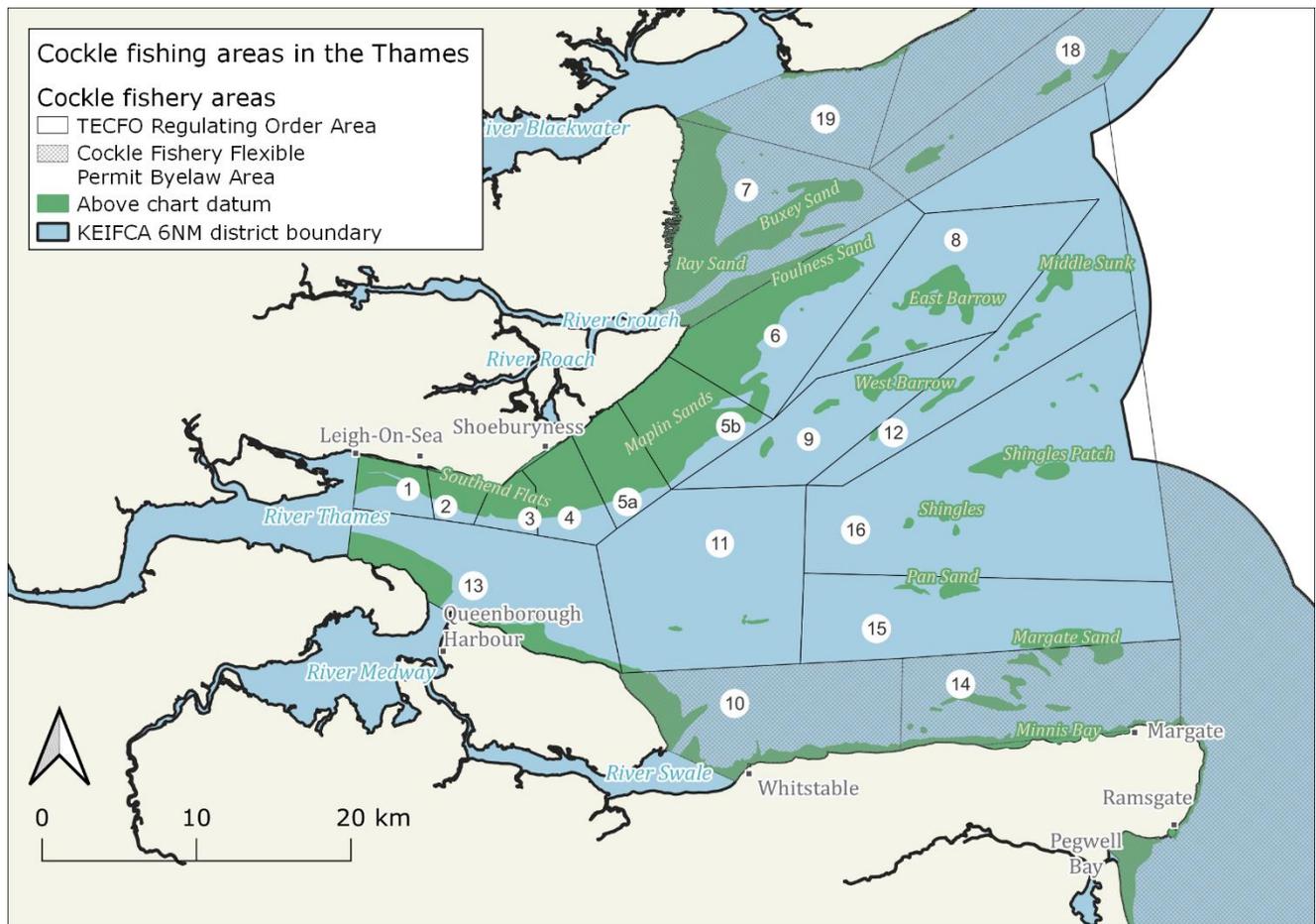


Figure 1: Cockle management areas in the Thames Estuary, showing two types of cockle fishery areas, as well as seabed above chart datum and sandbank names.

Chart area key:

Grounds within the area covered by the Thames Estuary Cockle Fishery Order 1994

1. Marsh End & Chapman Sands
2. East of pier
3. West of Shoebury boom
4. East of Shoebury boom
- 5a. South Maplin
- 5b. Mid Maplin
6. North Maplin & Foulness Sands
8. East Barrow & Maplin Spit
9. West Barrow
11. East Cant, Middle & Red Sand
12. Sunk Sand
13. West Cant & Scrapsgate
15. North Margate Sand & Pan Sand
16. Shingles & Long Sand

Grounds outside the area covered by the Thames Estuary Cockle Fishery Order 1994

- 1a. Inner Estuary
7. Buxey Ray & Dengie Sands
10. Leysdown & Ham.
14. South Margate Sands
17. South Kent Coast to Dungeness
18. Gunfleet Sand
19. Blackwater Estuary
20. Wallet & North Essex Coast

2 METHODS

2.1 Survey methodology

2.1.1 Sample collection from shore (quadrats)

Intertidal sandflats, accessible from shore in areas 2, 3, 4, 5a, 5b and 6 were accessed using all-terrain vehicles (ATVs; Figure 2a) within 2 hours of low water. Sampling of these areas was conducted during spring low tides in April 2021 and repeated for the core subset of main cockle harvesting areas; 4, 5a, 5b and 6, in September 2021 (Table 1). Samples were collected at each sample point in the survey grid (Figure 3) using a 0.1 m² quadrat. Sediment was removed from the upper 6 cm inside the 0.1 m² quadrat using a rake and sieved through a 5 mm square meshed sieve. Any cockles retained on the sieve were collected for further analyses.

2.1.2 Sample collection at sea (Day grab)

Surveys of intertidal cockle beds not accessible from shore were carried out from KEIFCA's vessel 'FPV Tamesis' during periods of high tide in April 2021 for all other areas (See Table 1). Samples were collected using a 0.1 m² Day grab which was lowered from the vessel via a hydraulic winch (Figure 2b). The contents of the day grab were emptied and sieved through a 5 mm square meshed sieve. Any cockles retained on the sieve were collected for further analyses.

The 2021 survey included new sample locations in areas 14 and 15. These locations represented an area (bisected by the boundary between these areas) which comprise a shallow sand bank on the Margate Sands. Additional samples were collected from the Margate Hook, another shallow sand bar in area 14. This followed the discovery of very high-quality cockles from the area during the 2020 fishing season.



Figure 2: Sample collection methods; (a) ATV, quadrat, rake and sieve; and (b) Day grab deployed from vessel

2.1.3 Biomass and stock size measurements

Cockles from each sample point were separated into year classes, identified by the number of growth rings visible on the outside of the shell. The cockles were tallied and cockles from each sample point in each year class were combined for each cockle management area. Cockles from each age class in each area were sorted into 3 size classes (<14 mm, 14 – 16 mm and >16 mm) using 14 mm and 16 mm sorting riddles. The minimum landing size for cockles within the KEIFCA district is 16 mm which relates to the smallest dimension of the cockle.

The total weight and number of cockles in each year and size class for each cockle management area were measured and used to estimate the total stock size and biomass of each age and size class of cockles.

2.2 Survey schedule

Sampling of the cockle beds commenced on the 1st April 2021, with the final cockle survey completed on the 12 September 2021. All surveys, areas and sampling methods are shown in Table 1.

Spring surveys tend to take place during April while autumn surveys are carried out for a subset of the sampling grid during September. The main objectives of the spring surveys are to estimate the population size and biomass and distribution of different age classes to base the TAC on. The main objectives of the autumn survey being to assess spat settlement and abundance, along with the distribution of the remaining cockles. The survey schedule is provided in Table 1. During the period from the 20th June to 7 October, the grounds were subject to controlled commercial fishing activity during 2021.

Table 1: Date and survey method, Thames Estuary, 2021

| Survey Area | Survey Date | Survey Method | Platform |
|-------------------------|------------------|---------------|----------------------|
| Areas 4, 5 & 6 (Spring) | 10 – 14 April | Quadrat | All-terrain vehicles |
| Areas 4, 5 & 6 (Autumn) | 8 – 12 September | Quadrat | All-terrain vehicles |

* Sites which were had a follow up survey carried out during summer (July 2021), see Annex 1.

2.3 Survey Array

Cockle sampling was carried out over a predetermined systematic sampling grid, for which their geographical localities are kept consistent over time to allow comparing the same areas over time. The sampling grid consisted of a series of parallel transect lines which were evenly spaced across the cockle beds. Samples were taken at predetermined points along each transect line. All samples were taken at positions recorded by GPS to be within 10 m of the target transect position, unless otherwise recorded.

The majority of the surveys utilised a sample grid consisting of one quarter of a minute latitude by one quarter of a minute longitude (464 m by 290 m) apart. Autumn surveys of the Maplin sands (areas 4, 5 & 6) use a sample grid of one-half minute latitude by one quarter of a minute longitude, covering the same total area.

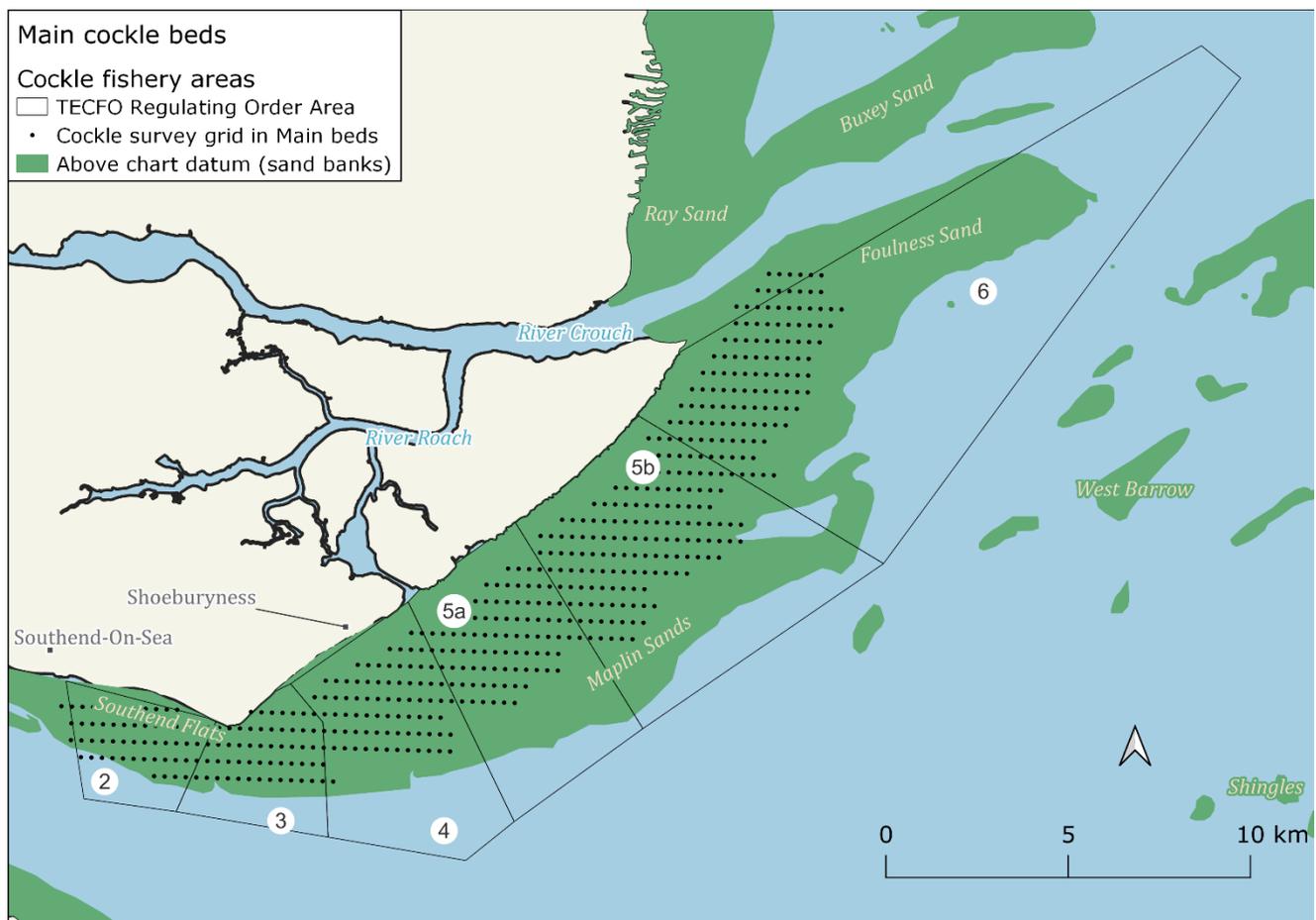


Figure 3: Cockle survey sampling positions in the main cockle harvesting areas 2, 3, 4, 5a, 5b and 6. Only areas 4-6 were sampled in 2020 owing to COVID-19 restrictions.

2.4 Area covered by survey

A total of 421 samples were taken during the 2020 spring surveys, and a further 202 during Autumn. The spring surveys covered an area of 113.3 km² (not including additional surveys in areas which were surveyed multiple times – see Annex 1) (Table 2)

Table 2: Number of samples taken and area of cockle beds surveyed in the Thames Estuary in 2021. (All samples in spring unless otherwise stated) (Blue represents Spring samples, and orange-yellow represents Autumn samples)

| Area | Number of samples | Area surveyed (km ²) |
|---|-------------------|----------------------------------|
| 4 East of Shoebury boom | 76 | 10.2 |
| 4 East of Shoebury boom (autumn) | 41 | 10.2 |
| 5 Maplin Sands | 226 | 30.4 |
| 5 Maplin Sands (autumn) | 105 | 30.4 |
| 6 North Maplin and Foulness Sand | 119 | 16.0 |
| 6 North Maplin and Foulness Sand (autumn) | 56 | 16.0 |
| Spring totals | 1214 | 158.5 |
| Autumn totals | 205 | 54.8 |
| Overall totals | 1419 | 213.3 |

2.5 Data analysis

The mean density of cockles in a given cockle management area, together with the size of the area (km²) was used to calculate the number of each year class of cockles in that area. The number of cockles and the mean weight of cockles in each age class were used to calculate the biomass of each year and size class of cockles within each cockle management area. The proportions of cockles above and below 16 mm were used to calculate the biomass of each year class cockles in that area above and below 16 mm.

3 RESULTS

- MAIN BEDS -

AREA 4

3.1 Area 4 assessment of stock (spring survey)

A total of 76 sites were sampled covering a total area of 10.2 km². The mean density, total stock, mean weight and biomass of each year class of cockles are presented in Table 3 and a summary of the stock assessment is presented below. The distribution of each year class is presented in Figures 3 – 7.

Table 3: Area 4 stock parameters, spring 2020

| Area 4 | No. Samples | Area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2019 | 2018 | 2017 | 2016 |
| | 76 | 10.2 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 3.6 | 153.9 | 198.2 | 34.7 |
| Stock (millions) | | | 36.3 | 1574.4 | 2026.5 | 355.2 |
| Mean Weight (g) | | | 0.5 | 2.1 | 3.5 | 3.9 |
| Biomass (tonnes) | | | 17.5 | 3308.8 | 7063.1 | 1399.5 |
| Biomass below 16 mm | | | 17.5 | 3287.3 | 5689.2 | 699.1 |
| Biomass 16 mm and above | | | | 21.5 | 1373.9 | 700.4 |

Summary of stock assessment for Area 4 (spring survey)

The final stock estimation, based on the survey area of **10.2 km²** are as follows:

Total number of cockles:

Total number of 2019 year class

36.3 million

Total number of 2018 and older year class

3956.1million

Total stock biomass

Total stock (all cockles)

11788.8 tonnes

Total stock biomass - cockles below 16mm

9693.1 tonnes

- cockles 16mm and above

2095.8tonnes

AREA 4

3.2 Area 4 assessment of stock (autumn survey)

The mean density, total stock, mean weight and biomass of each year class of cockles from the autumn 2020 survey are presented in Table 4 and a summary of the stock assessment is presented below. The density and distribution of spat is presented in Figures 2 – 7.

Table 4: Area 4 stock parameters, autumn 2020

| Area 4 | No. Samples | Area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2020 | 2019 | 2018 | 2017 |
| | 41 | 10.2 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 57.1 | 67.8 | 196.6 | 32.0 |
| Stock (millions) | | | 583.7 | 693.4 | 2010.4 | 326.8 |
| Mean Weight (g) | | | 0.4 | 2.5 | 3.2 | 5.1 |
| Biomass (tonnes) | | | 204.5 | 1742.0 | 6372.2 | 1659.9 |
| Biomass below 16 mm | | | 204.5 | 107.1 | 2574.5 | 1364.5 |
| Biomass 16 mm and above | | | 0.0 | 1634.9 | 3797.7 | 295.4 |

Summary of stock assessment for Area 4 (autumn survey)

The final stock estimation, based on the survey area of **10.2 km²** are as follows:

| | |
|---|-----------------------|
| Total number of cockles | |
| Total number of 2021 year class | 583.7 million |
| Total number of 2020 and older year class | 3030.6 million |
| | |
| Total stock biomass | |
| Total stock (all cockles) | 9978.6 tonnes |
| Total stock biomass - cockles below 16mm | 4250.7 tonnes |
| - cockles 16mm and above | 5727.9 tonnes |

AREA 5

3.3 Area 5 assessment of stock (spring survey)

A total of 221 sites were sampled covering a total area of 30.4 km². The mean density, total stock, mean weight and biomass of each year class of cockles are presented in Table 5 and a summary of the stock assessment is presented below. The distribution of each year class is presented in Figures 3 – 7.

Table 5: Area 5 stock parameters, spring 2020

| Area 5 | No. samples | area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2019 | 2018 | 2017 | 2016 |
| | 226 | 30.4 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 3.1 | 37.6 | 112.9 | 16.9 |
| Stock (millions) | | | 92.8 | 1143.8 | 3432.6 | 514.0 |
| Mean Weight (g) | | | 0.6 | 2.1 | 3.8 | 4.5 |
| Biomass (tonnes) | | | 53.1 | 2373.4 | 12988.6 | 2325.3 |
| Biomass below 16 mm | | | 53.1 | 2362.6 | 7358.9 | 956.0 |
| Biomass 16 mm and above | | | 0.0 | 10.7 | 5629.7 | 1369.4 |

Summary of stock assessment for Area 5 (spring survey)

The final stock estimation, based on the survey area of **29.7 km²** are as follows:

| | |
|---|-----------------------|
| Total number of cockles | |
| Total number of 2019 year class | 92.8 million |
| Total number of 2018 and older year class | 5090.4 million |
| | |
| Total stock biomass | |
| Total stock (all cockles) | 17740.3 tonnes |
| Total stock biomass - cockles below 16mm | 10730.5 tonnes |
| - cockles 16mm and above | 7009.8 tonnes |

3.4 Area 5 assessment of stock (autumn survey)

The mean density, total stock, mean weight and biomass of each year class of cockles are presented in Table 6 and a summary of the stock assessment is presented below. The density and distribution of spat is presented in Figures 3 -7.

Table 6: Area 5 stock parameters, autumn survey 2020

| Area 5 | No. samples | Area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2020 | 2019 | 2018 | 2017 |
| | 110 | 29.7 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 68.7 | 23.0 | 83.8 | 27.2 |
| Stock (millions) | | | 2088.2 | 698.0 | 2548.7 | 828.3 |
| Mean Weight (g) | | | 0.4 | 2.0 | 3.6 | 4.7 |
| Biomass (tonnes) | | | 793.6 | 1389.7 | 9220.5 | 3898.4 |
| Biomass below 16 mm | | | 793.6 | 391.6 | 6272.8 | 2494.8 |
| Biomass 16 mm and above | | | 0.0 | 998.0 | 2947.7 | 1403.6 |

Summary of stock assessment for Area 5 (autumn survey)

The final stock estimation, based on the survey area of **29.7 km²** are as follows:

Total number of cockles

Total number of 2020 year class

2088.2 million

Total number of 2019 and older year class

4075.0 million

Total stock biomass

Total stock (all cockles)

15302.1 tonnes

Total stock biomass - cockles below 16mm

9952.8 tonnes

- cockles 16mm and above

5349.3 tonnes

AREA 6

3.5 Area 6 assessment of stock (spring survey)

A total of 111 sample sites were surveyed covering an area of 16 km². The mean density, total stock, mean weight and biomass of each year class of cockles are presented in Table 7 and a summary of the stock assessment is presented below. The distribution of each year class is presented in Figures 3 – 7.

Table 7: Area 6 stock parameters, spring 2020

| Area 6 | No. samples | Area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2019 | 2018 | 2017 | 2016 |
| | 119 | 16 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 0.7 | 19.4 | 55.2 | 16.0 |
| Stock (millions) | | | 10.8 | 310.8 | 884.1 | 255.7 |
| Mean Weight (g) | | | 0.3 | 1.8 | 3.6 | 3.2 |
| Biomass (tonnes) | | | 3.6 | 547.7 | 3152.9 | 808.7 |
| Biomass below 16 mm | | | 3.6 | 547.7 | 2001.4 | 493.3 |
| Biomass 16 mm and above | | | 0.0 | 0.0 | 1151.5 | 315.4 |

Summary of stock assessment for Area 6, spring survey

The final stock estimation, based on the survey area of **16 km²** are as follows:

| | |
|---|-----------------------|
| Total number of cockles | |
| Total number of 2019 year class | 10.8 million |
| Total number of 2018 and older year class | 1450.6 million |
| | |
| Total stock biomass | |
| Total stock (all cockles) | 4512.8 tonnes |
| Total stock biomass - cockles below 16mm | 3045.9 tonnes |
| - cockles 16mm and above | 1466.9 tonnes |

3.6 Area 6 assessment of stock (autumn survey)

The mean density, total stock, mean weight and biomass of each year class of cockles from the 2020 autumn survey are presented in Table 8 and a summary of the stock assessment is presented below. The density and distribution of spat is presented in Figures 3 – 7.

Table 8: Area 6 stock parameters, autumn 2020

| Area 6 | No. samples | Area km ² | Year Class | | | |
|-------------------------|-------------|----------------------|------------|----------|----------|----------|
| | | | 2020 | 2019 | 2018 | 2017 |
| | 56 | 16 | 0-1 year | 1-2 year | 2-3 year | 3+ years |
| Mean Density | | | 65.9 | 20.4 | 36.8 | 38.4 |
| Stock (millions) | | | 1055.1 | 326.0 | 589.0 | 614.8 |
| Mean Weight (g) | | | 0.3 | 2.2 | 3.1 | 4.3 |
| Biomass (tonnes) | | | 348.8 | 719.5 | 1809.6 | 2671.7 |
| Biomass below 16 mm | | | 348.8 | 704.8 | 1503.7 | 994.0 |
| Biomass 16 mm and above | | | 0.0 | 14.7 | 305.8 | 1677.7 |

Summary of stock assessment for Area 6 (autumn survey)

The final stock estimation, based on the survey area of **16 km²** are as follows:

Total number of cockles

Total number of 2020 year class

1055.1 million

Total number of 2019 and older year class

1529.8 million

Total stock biomass

Total stock (all cockles)

5549.6 tonnes

Total stock biomass - cockles below 16mm

3551.4 tonnes

- cockles 16mm and above

1998.2 tonnes

3.7 Distribution of cockles in the main beds (areas 4, 5 & 6)

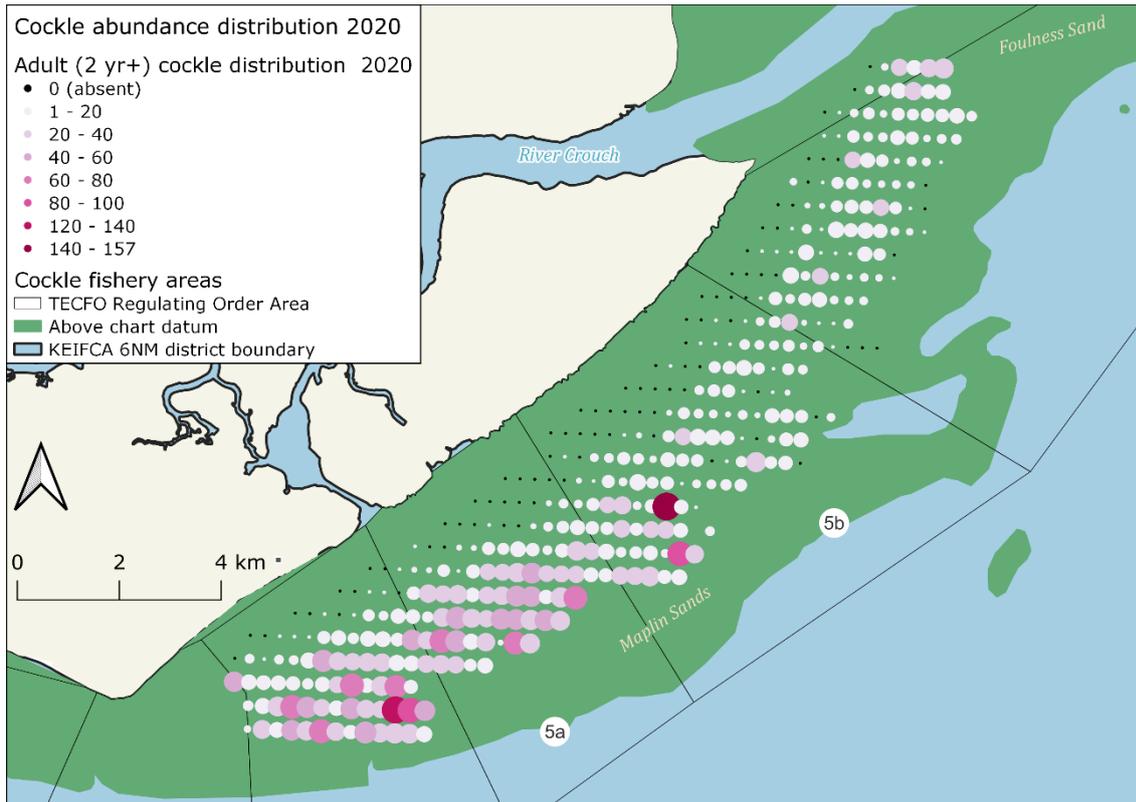


Figure 3: Distribution of 2 year and older (2016, 2017) adult class cockles in main beds (focussing on areas 4, 5 & 6), Thames Estuary, spring 2020.

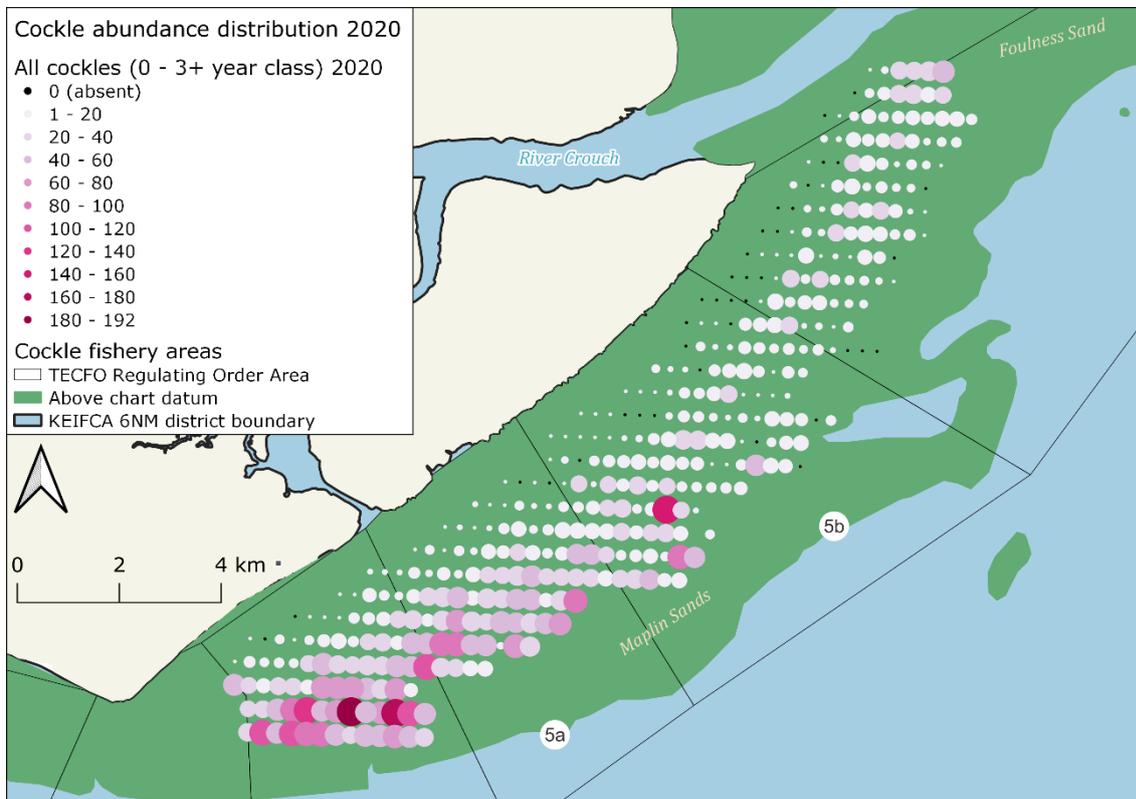


Figure 4: Distribution of all cockles (0 to 3+ year classes, where 3+ is the 2016 year class) areas 4, 5 & 6 of the Thames Estuary, spring 2020

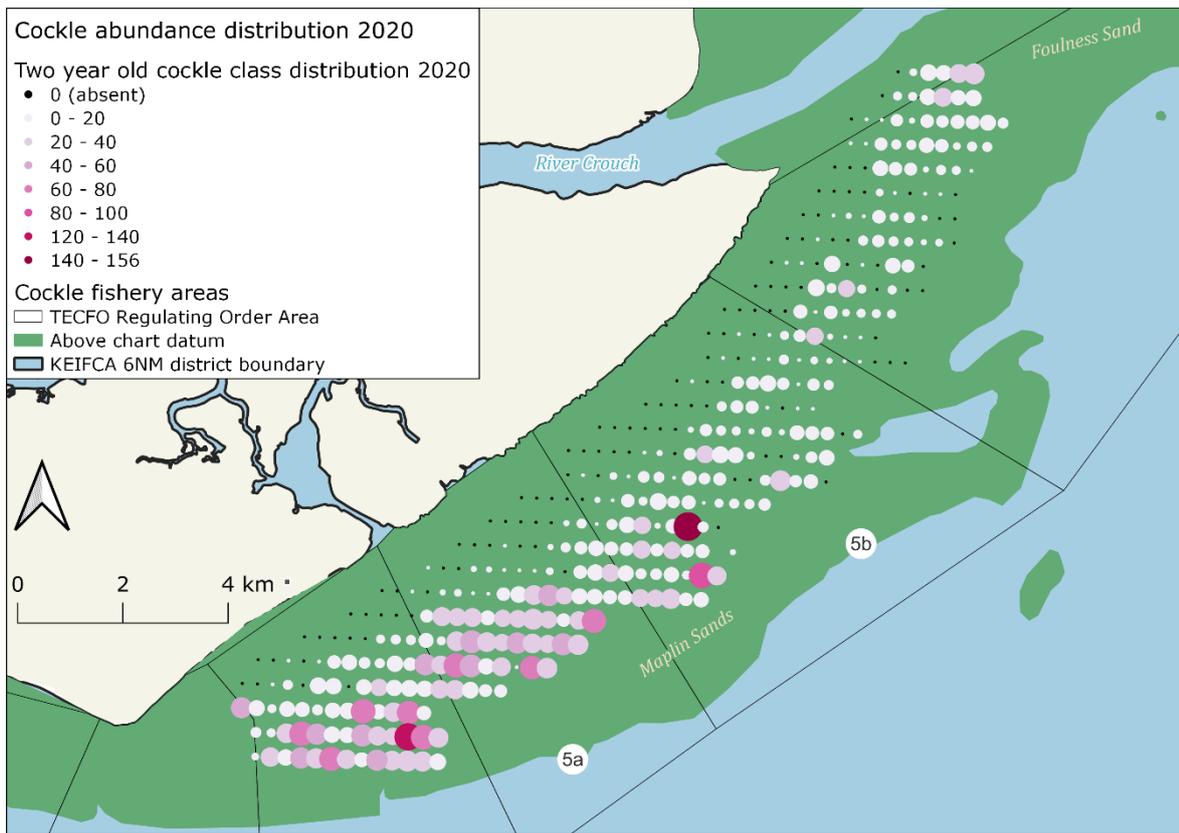


Figure 5: Distribution of 2-year-old class (2017) year class cockles in areas 4, 5 & 6 of the Thames Estuary, spring 2020

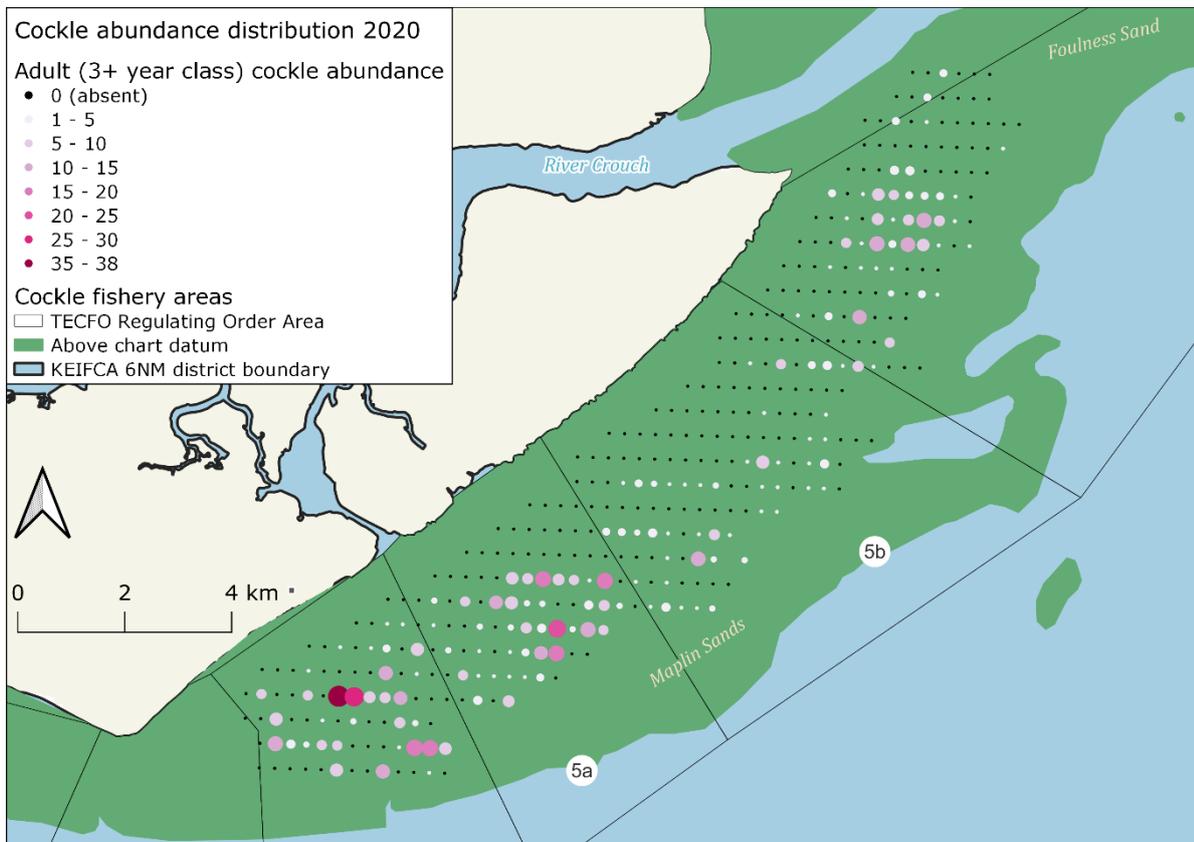


Figure 6: Distribution of 3-year-and-older year class (2016 and earlier) cockles in areas 4, 5 & 6 of the Thames Estuary, spring 2020

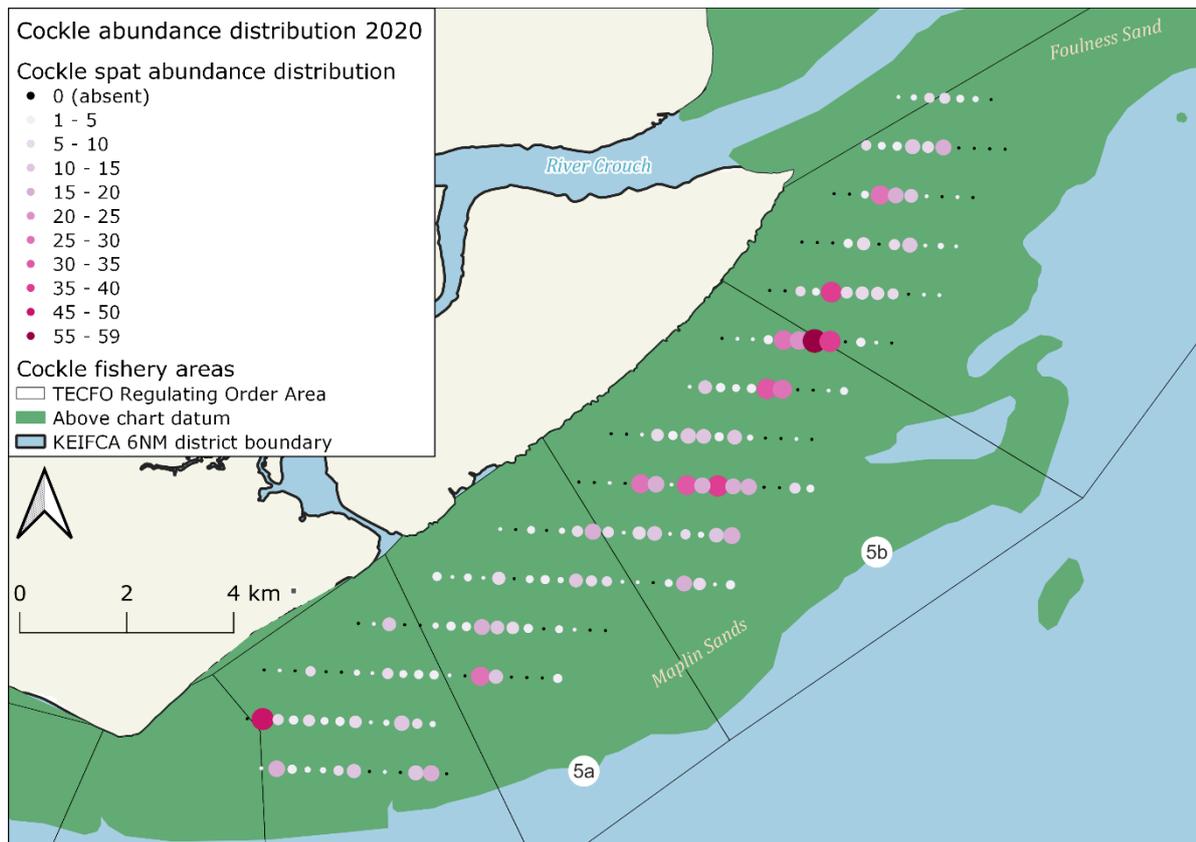


Figure 7. Distribution of cockle spat (0-year-class) in areas 4, 5 & 6 of the Thames Estuary, autumn 2020

3.8 Combined data for all surveys

In total, 113.3 km² of cockle beds were surveyed within the Thames estuary, with 623 sites sampled during Spring and Autumn 2020, as shown in Table 9. Within the core subset of the main harvesting areas (Areas 4, 5 & 6) a calculated total of 10497.1 million adult cockles were present during the Spring survey, and a calculated 8635.4 million adult cockles upon completion of the Autumn survey. The total biomass of cockles above 16 mm in the core subset of the main harvesting areas was 10572 tonnes during the spring and 13075 tonnes in the autumn.

Table 9: Survey area and cockle densities in the Thames Estuary, 2020

| Area | Area surveyed (km ²) | Total number of samples | | Total biomass of 1-3 yc (tonnes) | | Total biomass above 16 mm (tonnes) | | Total no. of 1-3 yc cockles (million) | |
|----------------|----------------------------------|-------------------------|--------------|----------------------------------|----------------|------------------------------------|----------------|---------------------------------------|---------------|
| | | Spring | Other | Spring | Other | Spring | Other | Spring | Other |
| 4 Maplin Sands | 10.2 | 76 | 41 | 11771.3 | 9774.1 | 2095.8 | 5727.9 | 3956.1 | 3030.6 |
| 5 Maplin Sands | 30.4 | 226 | 105 | 17687.3 | 14508.5 | 7009.8 | 5349.3 | 5090.4 | 4075.0 |
| 6 Maplin Sands | 16.0 | 119 | 56 | 4509.2 | 5200.7 | 1466.9 | 1998.2 | 1450.6 | 1529.8 |
| Total | 113.3 | 421.0 | 202.0 | 33967.8 | 29483.4 | 10572.4 | 13075.5 | 10497.0 | 8635.3 |

Survival of cockles in areas 4, 5 & 6

Comparison of the mean cockle density calculated from the 2020 spring survey and the autumn survey results in 2019 indicate that the survival over the 2019/20 winter period was within the normal range, and is indicated in Table 10 below. Younger cockles had lower survival rates than older cockles over the winter of 2019, and fits with the typical annual survival pattern. The lowest levels of survival (2.8%) were recorded for 1-year-old cockles in Area 6. Mean survival of all the 2017+ year class (3+ year old class) was high, recording an increase in stock density across areas 4, 5 & 6 over the 2020/21 winter.

Table 10. Mean density and winter survival rates of cockles from 2019 to 2020 by year class in areas 4, 5 & 6

| year class: | 2019 Autumn Survey | | | 2020 Spring Survey | | |
|---------------------------------|--------------------|-------|-------|--------------------|--------------|---------------|
| | mean density | | | mean density | | |
| | 2019 | 2018 | 2017+ | 2019 | 2018 | 2017+ |
| AREA 6 (57 rectangles) | 24.3 | 39.2 | 74.2 | 0.7 | 19.4 | 71.2 |
| AREA 5 (110 rectangles) | 13.3 | 118.5 | 98.5 | 3.1 | 37.6 | 129.8 |
| AREA 4 (36 rectangles) | 17.1 | 379.8 | 103.0 | 3.6 | 153.9 | 232.9 |
| Cockle stock remaining (Area 6) | | | | 2.8% | 49.5% | 95.9% |
| Cockle stock remaining (Area 5) | | | | 22.9% | 31.7% | 131.8% |
| Cockle stock remaining (Area 4) | | | | 20.8% | 40.5% | 226.2% |
| | Mean | | | 15.5% | 40.6% | 151.3% |

3.9 Long term trends in cockle populations within areas covered by the TECFO

Table 11: Autumn cockle stocks (millions) excluding spat within areas covered by the TECFO between 1993 & 2020

| YEAR | AREA | | | | | | | |
|------|--------------|--------------|--------------|----------|----------------|--------------|--------------|--------|
| | 1 | 2 | 3 | 4, 5 & 6 | 8 East Barrows | 11 | 13 | TOTAL |
| 1993 | | | | 4371 | 237 | | | 4608 |
| 1994 | | | 162 | 5721 | 287 | | | 6107 |
| 1995 | | 1276 | 2783 | 6789 | 26 | | | 10874 |
| 1996 | | 857 | 1064 | 4641 | 358 | | | 6920 |
| 1997 | | 166 | 1053 | 3963 | 78 | | | 5260 |
| 1998 | | 112 | 361 | 2154 | 77 | | | 2704 |
| 1999 | 246 | 1004 | 2087 | 13412 | 68 | | | 16817 |
| 2000 | | 397 | 941 | 8117 | 18 | | 655 | 10128 |
| 2001 | | 256 | 582 | 4588 | <1 | | | 5426 |
| 2002 | | 395 | 445 | 3907 | 3 | 3228 | | 7978 |
| 2003 | | 529 | 1156 | 8104 | 0 | | 420 | 5639 |
| 2004 | | 448 | 1495 | 4312 | | | | 6255 |
| 2005 | | 797 | 1086 | 3420 | | | 90 | 5393 |
| 2006 | | 405 | 545 | 6646 | 9 | 1278 | | 11484 |
| 2007 | | 755 | 1286 | 8966 | 8 | 4158 | | 15173 |
| 2008 | 535 | 433 | 385 | 7960 | 8 | | | 9321 |
| 2009 | | 618 | 1260 | 6976 | | | | 8854 |
| 2010 | | 1234 | 1126 | 5916 | 20 | | 172 | 8468 |
| 2011 | | 275 | 663 | 5084 | 11 | | 61 | 6094 |
| 2012 | | 198 | 480 | 3259 | | | 94 | 4031 |
| 2013 | 159 | 65 | 109 | 7561 | | | 85 | 7979 |
| 2014 | | 30 | 127 | 5152 | | | | 5309 |
| 2015 | | | | 6026 | | | | 6026 |
| 2016 | | | | 3597 | | | | 3597 |
| 2017 | | | | 7589 | | | | 7589 |
| 2018 | | | | 12030 | | | | 12030 |
| 2019 | | | | 13318 | | | | 13318 |
| 2020 | Not surveyed | Not surveyed | Not surveyed | 8635.4 | Not surveyed | Not surveyed | Not surveyed | 8635.4 |

3.10 Comparison of long-term trends for areas 4, 5 & 6

Surveys of the Areas 4, 5 & 6 within the TECFO have now been carried out for almost two decades.

Adult cockle stocks followed continued a short-term declining trend (Figure 8). This is not a cause for concern at this stage because the stock size recorded over spring 2021 was not far below the long-term spring mean value. The stock size recorded over autumn 2021 was above the long-term autumn mean value. The substantial variation observed in the stock size over time appears to be driven by recruitment success and over winter survivorship. The relatively low spatfall values in 2020 and 2021 suggests that the adult cockle population size for 2022's may be smaller than the preceding two years.

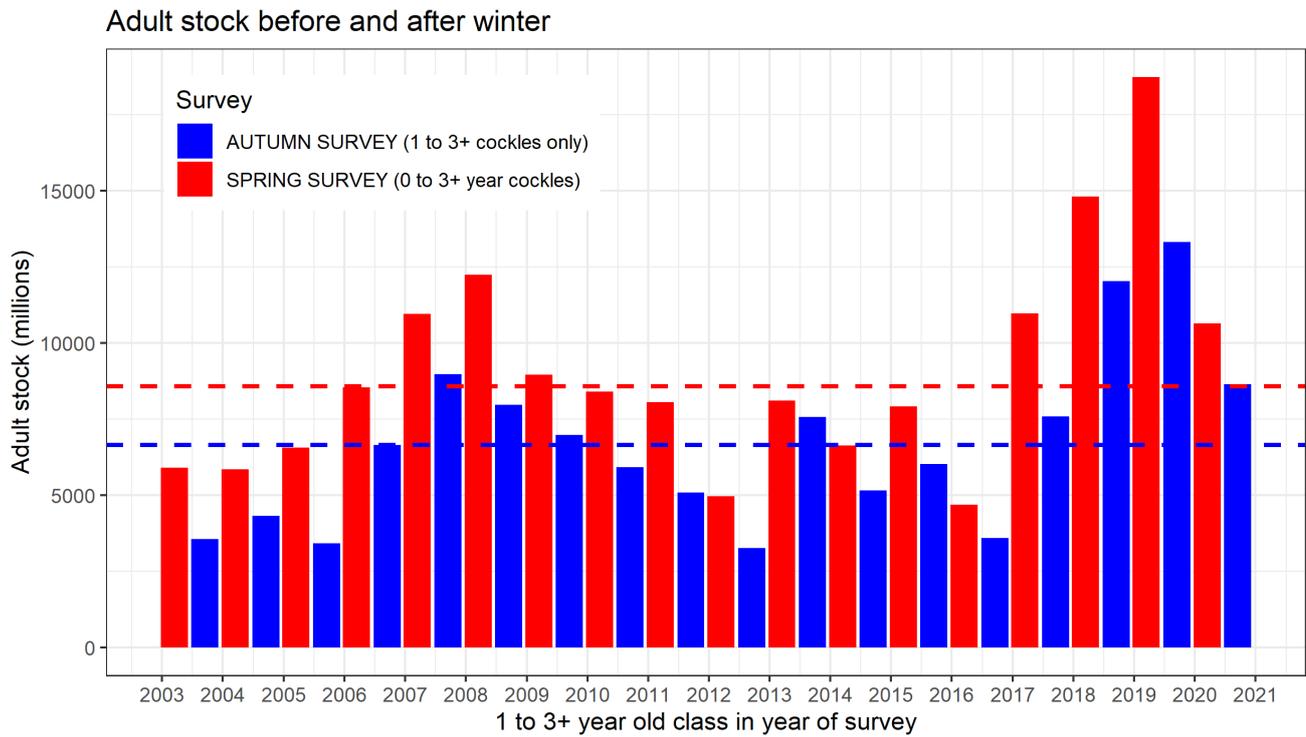


Figure 8: Total cockle stocks not including that year's spat on areas 4, 5 and 6 from 2003 to end of 2020, with mean values indicated by dashed lines for spring and autumn respectively.

Stock size of spat before and after first winter

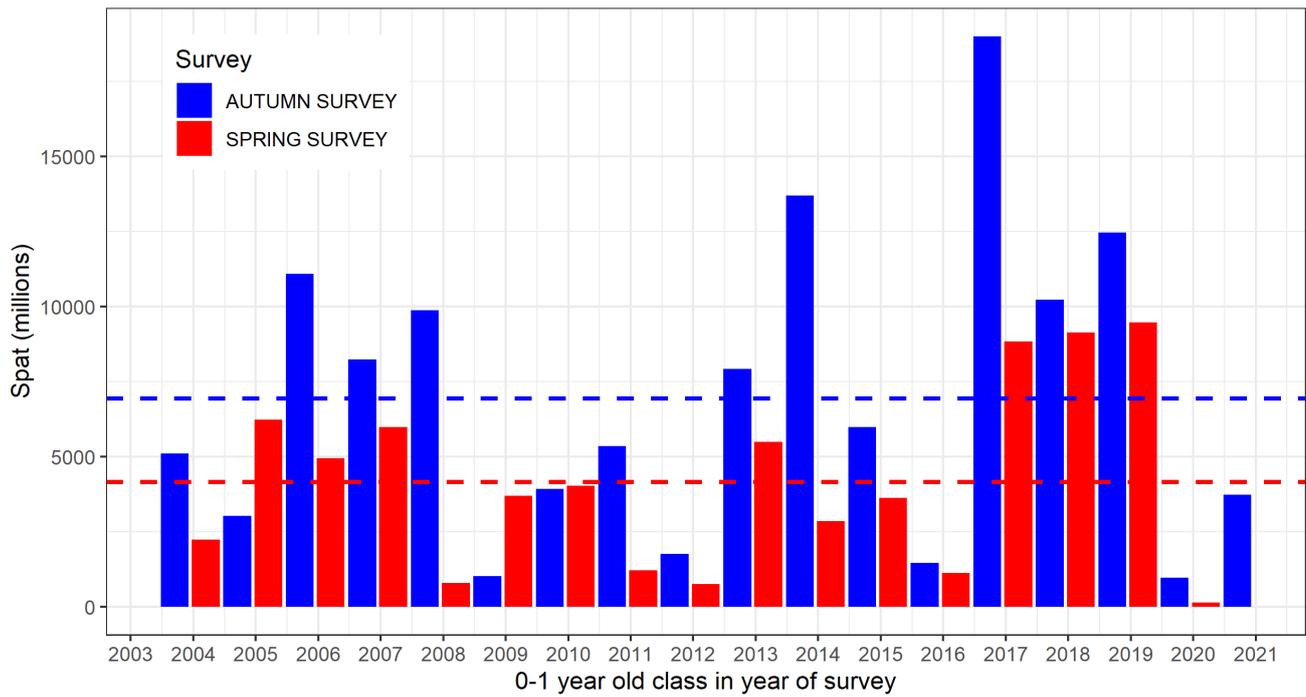
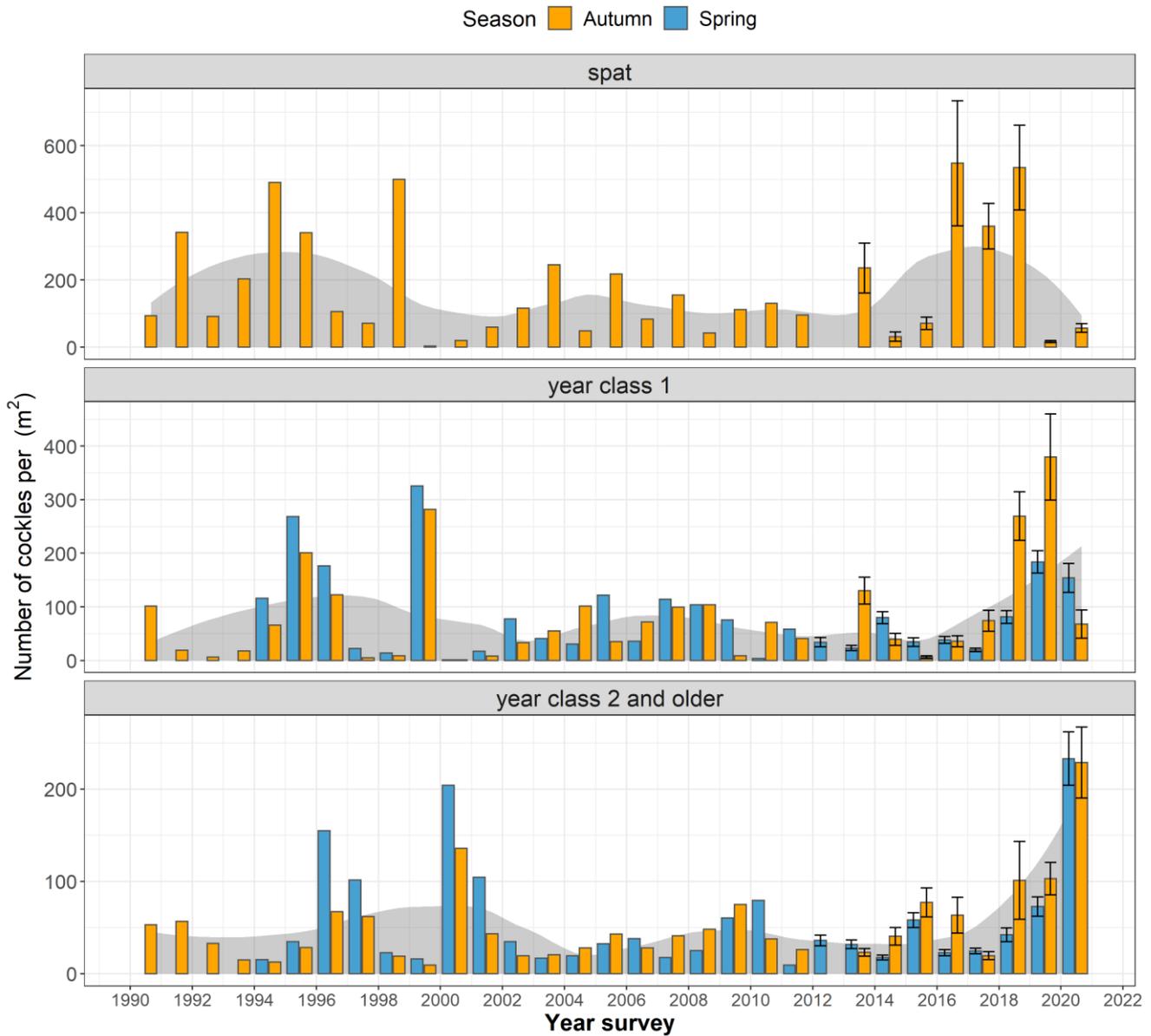


Figure 9: Number of cockle spat before and after the first winter on areas 4, 5 and 6 from 2004-2020, with mean values indicated by dashed lines for spring and autumn respectively

3.11 Comparison of long-term trends for Area 4

Cockle density for area: 4



Cockle biomass for area: 4

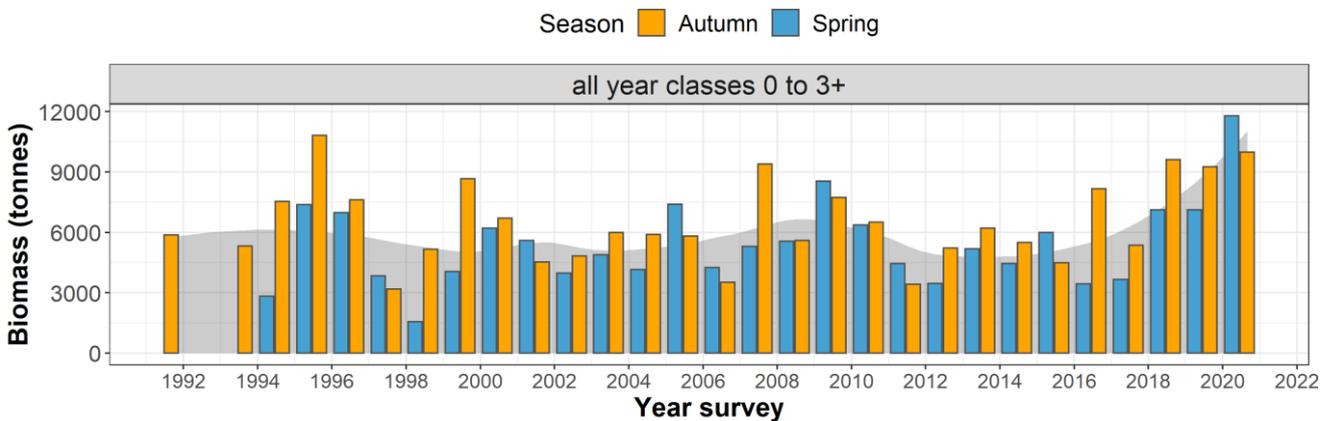
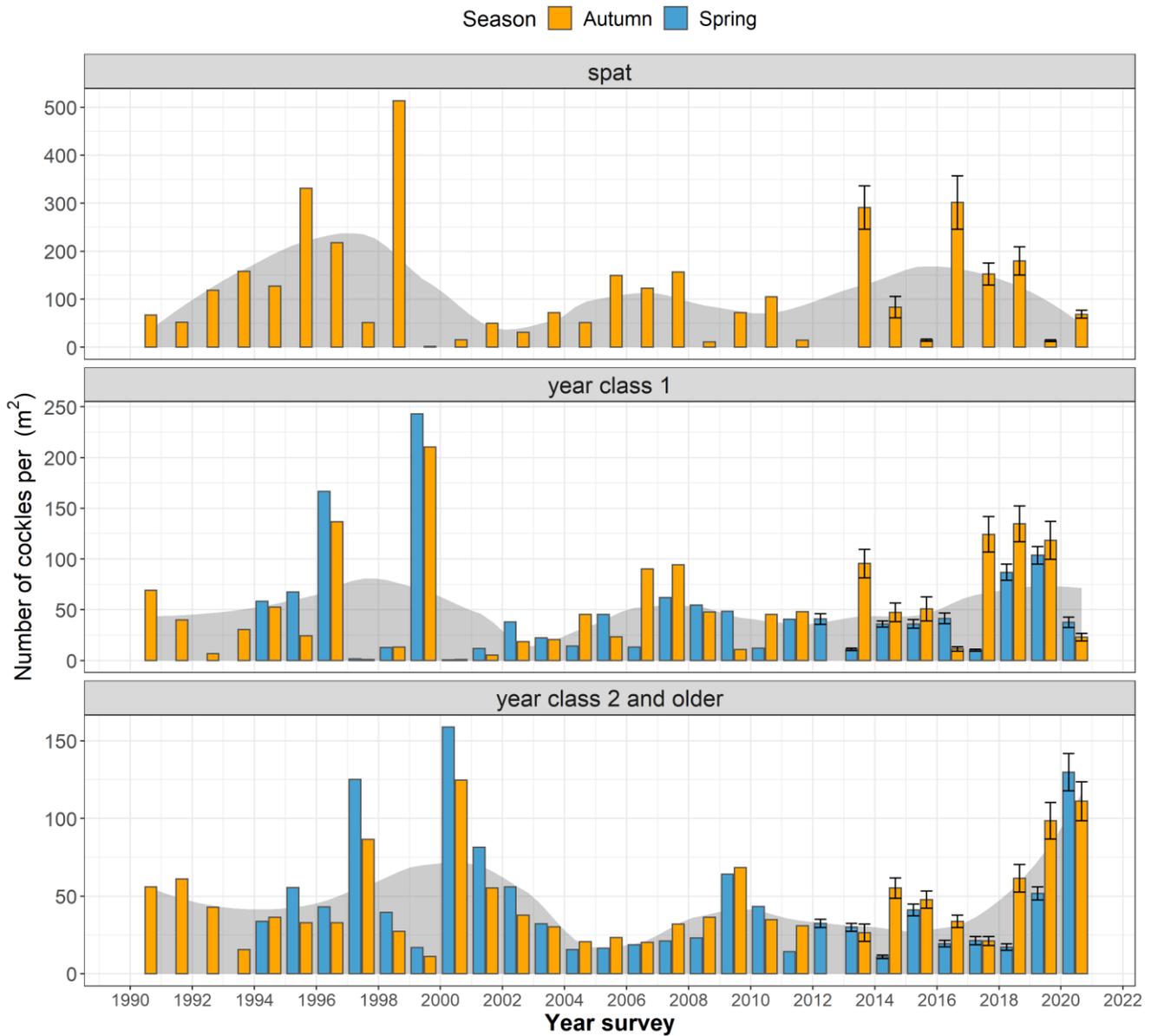


Figure 10: Mean cockle densities & total stock biomass in Area 4, 1990-2020

3.12 Comparison of long-term trends for area 5

Cockle density for area: 5



Cockle biomass for area: 5

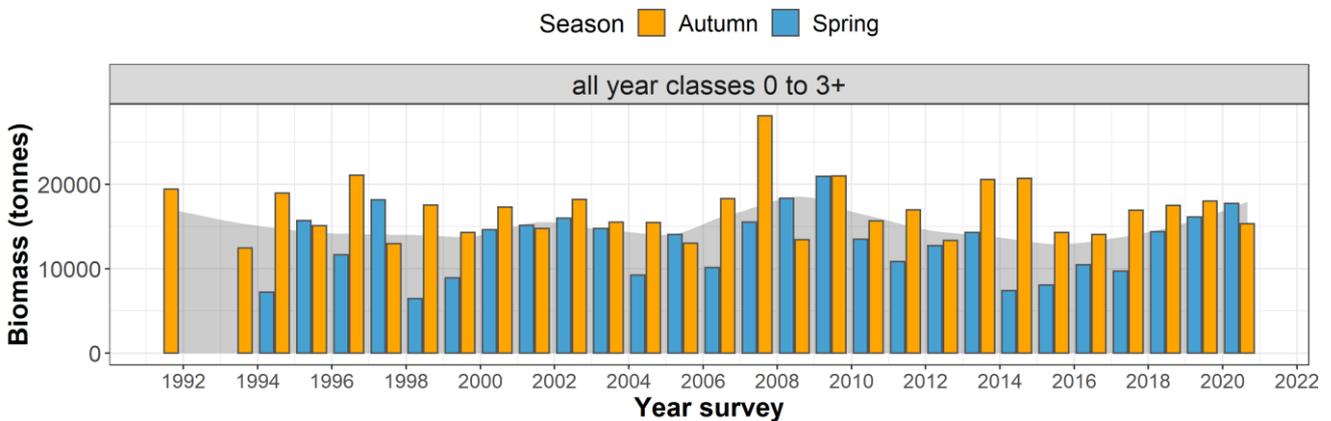
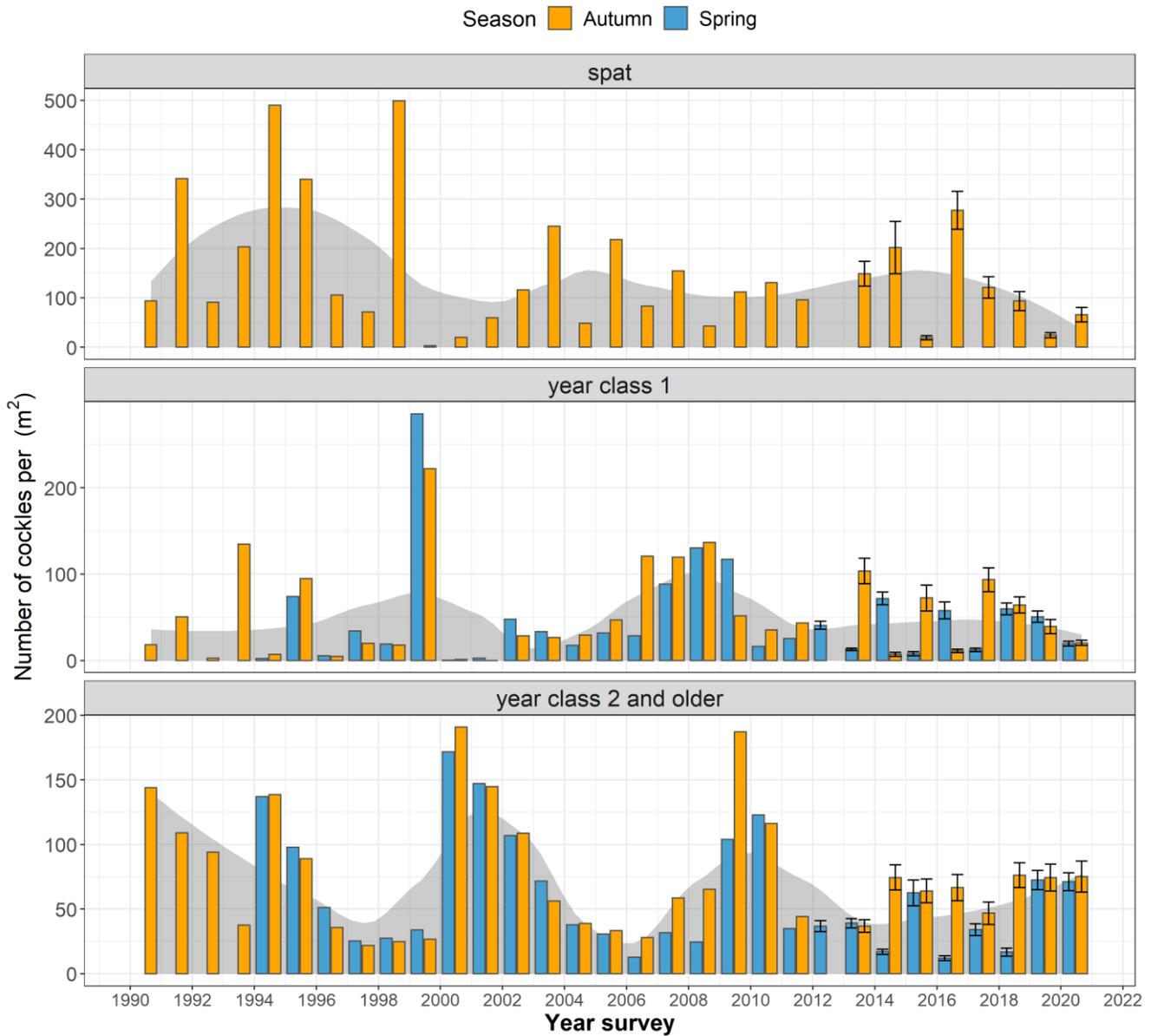


Figure 11: Mean cockle densities & total stock biomass in area 5, 1990-2020

3.13 Comparison of long-term trends for area 6

Cockle density for area: 6



Cockle biomass for area: 6

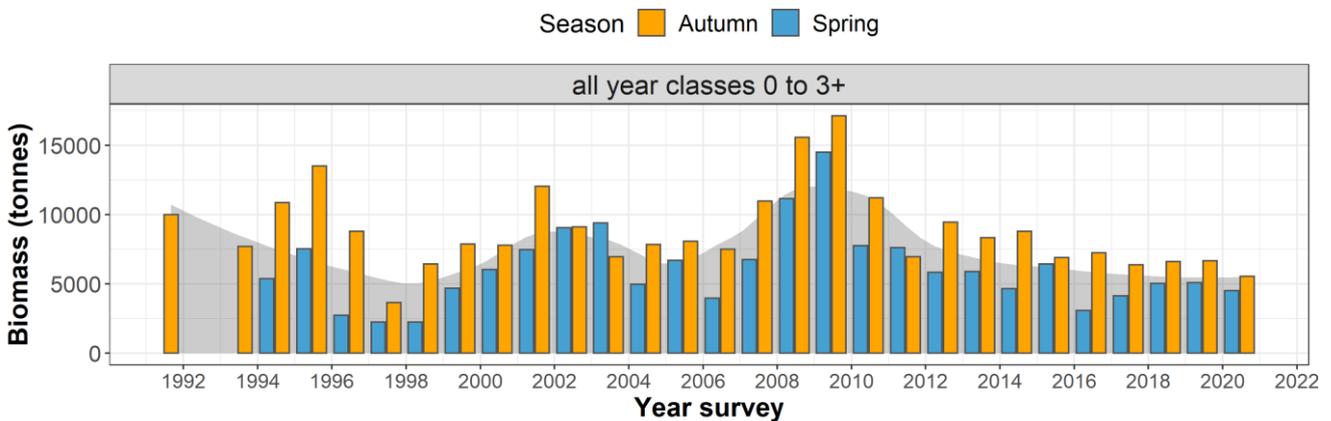


Figure 12: Mean cockle densities & total stock biomass in area 6, 1990-2020

4 CONCLUSION

4.1 Summary of results

A total area of 113.3 km² was surveyed during 2020, with a total of 623 samples taken, a substantial lower survey coverage than the years preceding COVID-19. Sampling was restricted to the Maplin and Foulness Sands (Areas 4, 5 & 6), which is the core subset of the main commercial harvesting areas. A total of 421 samples were collected during the Spring survey and 202 during the autumn survey.

The total number of adult cockles (excluding any spat) on the Maplin and Foulness Sands (the core subset of the main beds) was estimated at 10497 million cockles in the spring and 8635.3 million in the autumn (representing approximately 18 % decline). The 2020 total biomass of cockles above 16 mm in the core subset of the main harvesting areas was 10572.4 tonnes during the spring and 13075.5 tonnes in the autumn. An increase in biomass from spring to autumn is the result of the growth over the summer period, whereas an increase in the overall number of adult cockles occurs when the 0-1 year class of cockles from the spring grows to reach adult size by the autumn of the same year. Conversely, overall declines in number of cockles and biomass are likely to be caused by mortality of adult stock, which removes numbers and biomass from the overall population, and can in turn be attributed to environmental and fishing pressures. The declines in the number of cockles observed in these main beds could largely be attributed to a decline in the 1-2 year class in areas 4 and declines in 2 – 3 year class in 5 over the summer, with densities falling from 154/m² to 68/m², and 112/m² to 83.3/m².

The estimated number of cockle spat in 2020 (i.e. the number of individual cockles in the 0-1 year class in 2020) on the Maplin and Foulness Sands during autumn was 3727 million individuals. This was a relatively low level of spat compared to the high levels recorded between 2016 and 2018 preceding years, but higher than 2019 at 957 million spat. Low spatfall has been recorded at least four times since 2003, and is known to be highly variable. Survival of spat over the winter of 2019/2020 was very low (15%), and well below the historical average of 60 %.

4.2 Implications for future management of the fishery

Data from the 2020 cockle survey contributes to a long-term data set of cockle stocks used to inform long term stock management strategies, and adjust year to year management measures, such as the Total Allowable Catch (TAC) limits from year to year.

Analysis of the cockle population since surveys commenced in 1998 indicate periodic fluctuations, with typical peaks and troughs. The stocks recorded in 2020 represents a very high level of adult stock – the highest since 2003. This peak in the Thames cockle stock-size is the result of three years (2016 – 2018) of exceptionally high levels of spatfall and relatively high levels of over-winter survivorship which have now reached maturity. However, the two consecutive years of low spatfall (2019, 2020) and low survival of spat over winter in 2019/2020 suggests that the peak in adult stock will not be maintained over the longer period. The relatively high stock level was offset by low spatfall when setting TAC limits for 2020. Spatfall in 2021 and 2022, along with over winter survivorship will be closely monitored to help inform making management decisions, such as TAC limits for next year.

Cockle surveys during 2020 were heavily influenced by COVID-19 restrictions. KEIFCA made every effort to obtain the most essential data needed to support sustainable management for the cockle fishery, while operating in a safe manner. The stock assessment data collected during 2020 was able to support key fishery management decisions, however, it lacked the ability to provide a clear picture of what was happening in the non-surveyed cockle beds. Information on these non-core beds is important for other measures, such as spatial management measures, where some beds may be closed or opened based on the stock levels within a given cockle area. While KEIFCA could manage a fishery for one year without carrying out the full suite of surveys, it is imperative to resume these as soon as possible to ensure that the critical data required to inform the sustainable management of the fishery is collected.