Southern IFCA Poole Harbour Bivalve Survey- 2024

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1.0 Introduction

This paper outlines the 2024 Poole Harbour Bivalve Survey, which is undertaken annually to monitor commercially viable shellfish beds in Poole Harbour, UK. The survey began in 2015 and results are used as a baseline against which to monitor trends in stock levels and potential changes in the population of commercial bivalve species, to support Southern IFCA's management decisions and aid in the evaluation of the sustainability of the Poole Harbour Dredge Fishery.

The survey evaluates length frequency and Catch per Unit Effort (CPUE) data from 27 commercially fished shellfish beds in Poole Harbour (see Section 1.5) over 11 catch zones. The survey focuses on the primary commercially harvested species, the common cockle (*Cerastoderma edule)* and Manila clam (*Ruditapes philippinarum)* (length frequency and CPUE), with length frequency information only collected for other bivalve species.

1.1 The fishery

Shellfish dredging in Poole Harbour originated using hand-ranking techniques to gather cockles. This was followed by the introduction of Manila clams in the 1980s, with the intent of establishing commercial aquaculture. The fishery transferred to the use of mechanical dredging as infrastructure advanced, which lead to the development of the pump-scoop dredge, which is currently seen in the modern-day fishery (*Figure 1)*. The Manila clam and common cockle are the primary species harvested however, American Hard-Shelled clams (*Mercenaria mercenaria*) and the native clam (*Ruditapes decussatus*) are also harvested in smaller quantities.

The Poole Harbour clam and cockle fishery was awarded dual certification under the Marine Stewardship Council's Sustainability Standard and the Seafish Responsible Fishing Scheme in 2018, the MSC Standard maintained through re-certification in 2023. The fishery runs from 25th May to 23rd December annually.

Figure 1*. An example of the pump-scoop dredge which is used within the modern-day Poole Harbour Dredge Fishery to fish for clam and cockle species.*

1.2 Pump-Scoop Dredge

The pump-scoop dredge was engineered to minimise ecological damage while maximising efficiency. Water jets are pressured towards the back of the dredge basket, directing sediment movement through the basket. Dredge type and construction are restricted under the permit conditions of the Poole Harbour Dredge Permit Byelaw. The horsepower of the dredge may not exceed 15 and the basket size may not exceed 460mm in width by 460mm in depth by 300mm high (excluding poles or attachments). Dredge bars must have no less than 18mm between them and cross pieces used to strengthen the dredge basked must have a minimum space of 40mm between them. Dredges must have a mandatory

riddle (secondary sorting system) with bar spacing of 18mm for sorting shellfish. Figure 2 shows an example pump-scoop-dredge.

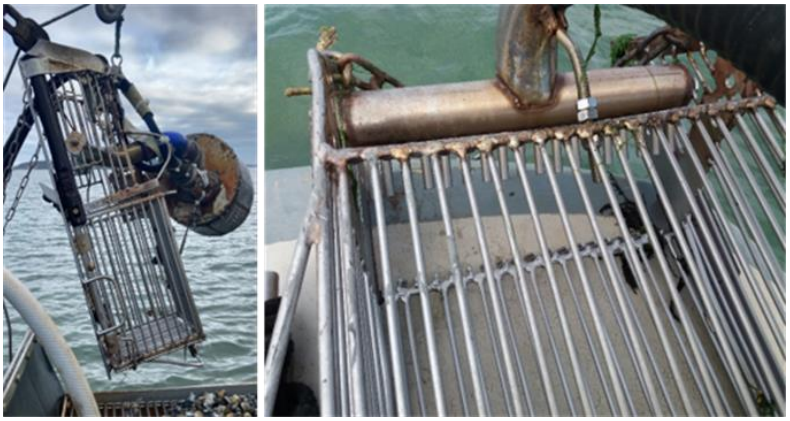

***Figure 2**. An example of the pump-scoop dredge used within the Poole Harbour Dredge Permit fishery.*

1.3 Manila clam *(Ruditapes philippinarum)*

The Manila clam (*Figure 3*) was introduced to Poole Harbour in 1988 for the purpose of aquaculture and became a self-sustaining population (Jensen *et al.,* 2004; Jensen *et al.,* 2005; Humphreys *et al.,* 2007). Manila clams inhabit muddy and fine sediments in the intertidal zone and shallows (Jensen *et al.,* 2005). They dwell in the top 40mm of the substratum, but can bury as deep as 100mm, and filter phytoplankton and sedimentary organic matter from the water (Lee, 1966; Dang *et al.,* 2009). Poole Harbour provides a relatively sheltered, nutrient rich, shallow water habitat with extensive intertidal mud flats, and temperatures up to 27°C in the summer. This provides optimum reproductive conditions for the species (Toba and Miyama, 1995; Jensen *et al.,* 2004; Jensen *et al.,* 2005; Chung *et al.,* 2005; Humphreys *et al.,* 2007).

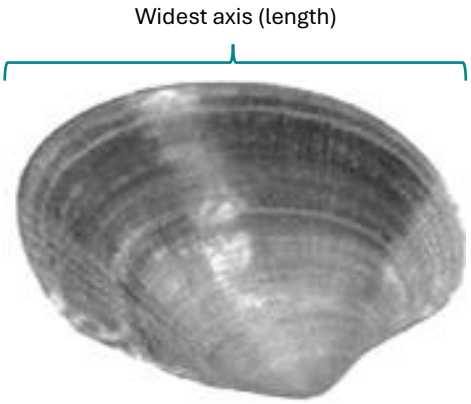

***Figure 3.** A diagram of the Manila clam. The widest point (length) was used to obtain length data within the Poole Bivalve Survey 2024.*

In Poole Harbour the Manila clam spawning season occurs from July to September (Grisley, 2003; Jensen *et al.,* 2005; Tumnoi, 2012). Water temperature between 8°C and 27°C provides suitable conditions for larval development (Chung *et al.,* 2005; Drummond *et al.* 2006; Moura *et al.,* 2018). Below this threshold Manila clams are thought to be sexually inactive. In Poole Harbour, Manila clam are capable of spawning more than once throughout the summer depending on environmental conditions with peak activity in September (Jensen *et al.,* 2004; Humphreys *et al.,* 2007). Similarly, in this area, juveniles grow up to 20 mm in their first 24 months (Jensen *et al.,* 2004). The rate of growth then reduces once individuals have reached sexual maturity.

1.4 Common cockle *(Cerastoderma edule)*

The common cockle (*Figure 4*) is commonly found to inhabit sandy bays and estuaries throughout the Southern IFCA District. Individuals burrow up to 50mm below the surface of sandy and fine gravel seabed from middle to lower intertidal zones. Cockles grow to up to 38mm for males, 20mm for females and are known for their distinct shell with 22-28 ribs (Tyler Walters, 2007). In the UK, spawning occurs between March and August and gametogenesis is initiated in the previous winter months (October to March) (Seed and Brown, 1977; Newell & Bayne, 1980).

Growth rate decreases with increasing tidal height, due to lack of immersion time and limited food availability and opportunity (Richardson *et al.,* 1980; Jensen, 1993; Montaudouin, 1996; Montaudouin & Bachelet, 1996). Similarly, in winter months, metabolic rate is slowed due to decreasing temperatures and cockles' inability to acclimatise. Cockles are filter feeders and individuals have the capability to filter half a litre of water per hour. The cockle fishery within Poole Harbour has commercial importance and populations densities of up to 10,000 per square metre have been recorded.

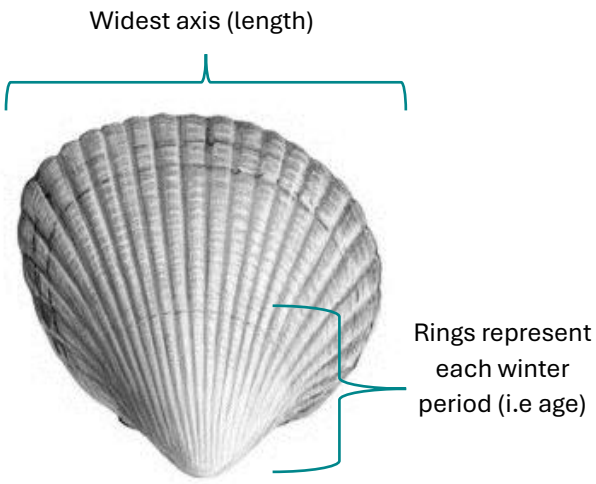

***Figure 4**. A diagram of the common cockle. Dark rings represent the number of wintering months which is used to decipher age. The widest axis (length) is highlighted, which was used to obtain length frequency data within the Poole Bivalve Survey 2024.*

1.5 Southern IFCA Management

The fishery is managed under the Poole Harbour Dredge Permit Byelaw 2015[1]. The byelaw manages the use of the pump-scoop dredge through a permit system, with up to 45 permits issued each year, where the permit is required to use, store, retain on board and transport the pump-scoop dredge equipment within Poole Harbour. The byelaw regulates a number of elements of the fishing operation including:

- Gear types, construction and restriction
- Spatial and temporal restrictions
- Catch restrictions
- Reporting

As part of catch reporting requirements, fishers must submit a monthly catch return indicating, for each day fished, the hours fished, the quantities of species caught and the buyer(s). Fishers must also indicate which of 11 catch zones the catch has come from to allow for catch data to be related to the annual stock survey.

[1] Poole-Harbourr-Dredge-Permit-Byelaw.pdf

The fishery is located within the boundaries of the Poole Harbour Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar Site, the Southern IFCA undertakes a Habitats Regulations Assessment to ensure that in permitting this fishery, Southern IFCA are operating in line with their legal duties under relevant legislations and there is no adverse effect on the SPA, SSSI or Ramsar Site from the fishery[2][3].

2.0 Methodology

The survey took place between 8th-11th April 2024 and used local fishing vessel, FV David's Dream. A pump-scoop dredge was used in line with normal fishing practice and management measures (see Section 1.5). The pump-scoop dredge is inherently size selective as fishers want to reduce the amount of post-capture measuring required to ensure compliance with MCRS. It is recognised therefore that the survey methodology will not fully sample the population below MCRS, although every effort is made to capture all shellfish from the dredge before it passes through the riddle. However, the sampling is carried out the same way each year therefore whilst the samples are not fully representative of the below MCRS part of the population there is the ability to make comparisons between years for under MCRS CPUE and length frequency due to the consistency in methodology.

The following methodology was followed:

1. Three dredge tows were conducted within a radius of 20m from a predetermined central point of each site. This central point is consistent across all survey years (*Table 1*).
2. After 2 minutes the dredge was brought inboard and bivalves were retained and labelled to the corresponding site and dredge tow (e.g. Site 1 Dredge 1).
3. Each species was identified, and the first 50 individuals were measured at their widest axis to the nearest millimetre (please refer to Figure 3 and Figure 4, which illustrates the measurement parameters).
4. Manila clams and common cockles were separated into above and below their relative Minimum Conservation Reference Size (MCRS) (35mm and 23.8mm respectively) and weighed.
5. Following measurement, all samples were returned to shellfish production areas within the same classification.

[2]Poole Harbour HR 2024-2025 season

***Table 1** identifies the sites surveyed within the Poole Harbour Bivalve survey 2024 and their corresponding shellfish catch zones and reference points.*

Site Number	Site Name	Zone	Latitude		Longitude	
1	Middle Ground	1	50	42.147	1	57.205
2	Whitley Lake	2	50	41.875	1	56.337
3	Aunt Betty	1	50	41.959	1	57.813
4	Blood Alley	3	50	40.900	1	58.023
5	Jerry's Point	3	50	40.498	1	57.717
6	Brands Bay South	4	50	40.040	1	58.569
7	Brands Bay West	4	50	40.362	1	58.837
8	Furzey Island	8	50	41.110	1	59.384
10	Newtons Bay	5	50	40.286	1	59.671
11	Ower Bay	6	50	40.617	2	00.282
11(2)	Wards	8	50	40.943	2	00.272
12	Round Island	8	50	41.027	2	01.053
13	Wych and Middlebere Lake	7	50	40.804	2	01.653
14	Long Island	8	50	41.457	2	00.803
15	Arne	9	50	41.914	2	01.425
15(2)	Inner Arne	9	50	42.006	2	01.621
16	Patchins Point	1	50	42.224	2	01.180
17	Giggers	11	50	41.575	2	03.996
18	Keysworth	11	50	42.175	2	03.894
18(2)	Inner Keysworth	11	50	42.215	2	04.181
19	Holton Mere	10	50	42.499	2	03.488
19(2)	Inner Holton Mere	10	50	42.629	2	03.965
20	Seagull	10	50	42.660	2	02.964
21	Rockley Spit	10	50	42.931	2	02.501
22	Hamworthy	1	50	42.494	2	00.437
23	Upton Lake	HB	50	43.546	2	00.267
24	Creekmore Lake	HB	50	43.610	1	59.738

3.0 Results

Results focus on the predominant commercial species within the harbour, Manila clam and common cockle. Other species found during the survey and harvested at a smaller scale include American Hard-Shelled clam *(Mercenaria mercenaria*), the Native *clam (Ruditapes decussatus*), the native oyster (*Ostrea edulis*), the Pacific oyster *(Magallana gigas*), the spiny cockle (*Acanthocardia aculeata)* and the blue mussel (*Mytilus edulis)*.

Length frequency data was analysed in reference to site, whereas Catch Per Unit Effort Data was applied to the 11 shellfish catch reporting zones under the Poole Harbour Dredge Permit Byelaw (Figure 5).

Length frequency data and Catch Per Unit Effort Data (CPUE) were examined using Excel and R Studio. CPUE was determined using the weight data while factoring the size of the dredge and length of tows. Units of CPUE are kilograms per metre of dredge per hour (kg/m/hr).

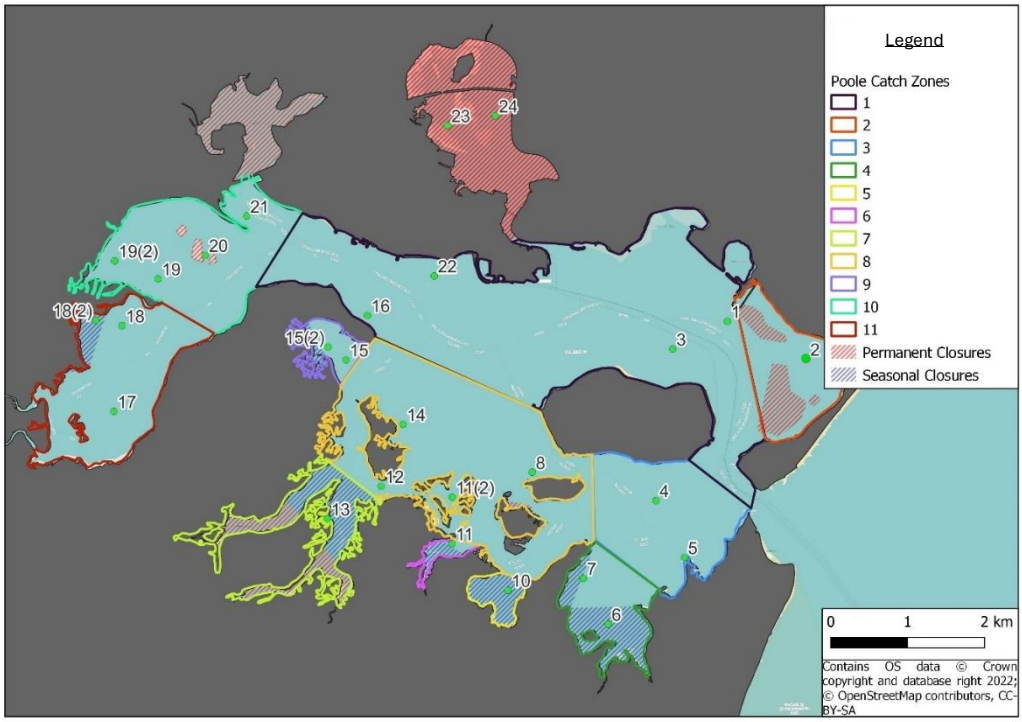

***Figure 5**. A visual representation of the sites within the Poole Harbour Bivalve Survey 2024. Sites are located with 11 shellfish catch zones. Seasonal and permanent closures included within the Poole Harbour Dredge Permit Byelaw have also been included.*

3.1 Length Frequency Data

Statistical analysis of length data within the 2024 dataset and comparisons of length data within the last three years showed statistical differences ($p<0.01$ for both Manila clam and cockle), however this was expected due to the range of sizes observed across the 81 dredges within the 27 sites of the harbour in each survey.

3.1.1 Manila Clam

- The average size of Manila clam in 2024 varied from 44mm at site 4 (n=29) to 33mm at site 19(2) (n= 150) (*Figure 6)*.
- All sites had an average length above the MCRS (35mm), except sites 18(2) and 19(2).

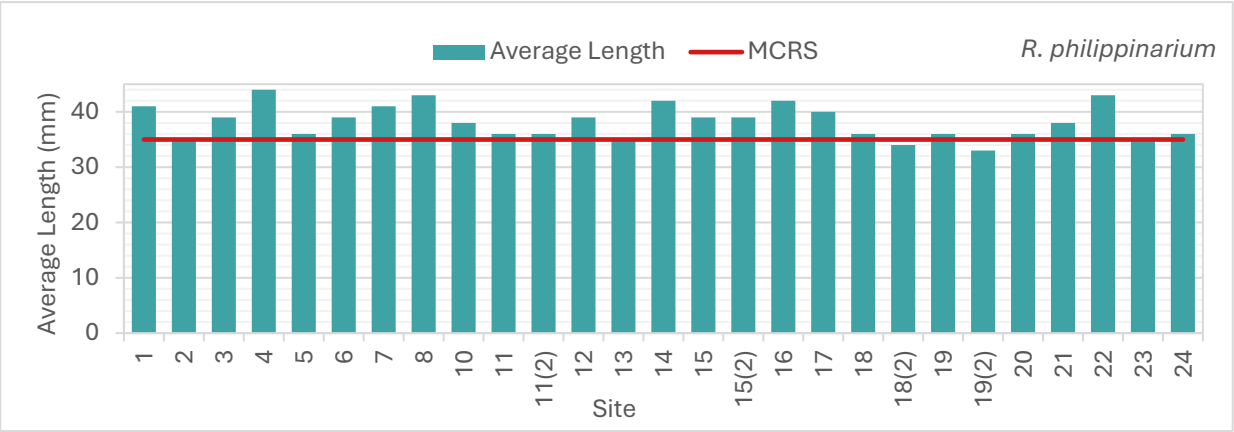

***Figure 6**. The average length of Manila clam in each of the surveyed sites in the Poole Harbour Dredge Bivalve Survey 2024. The corresponding Minimum Conservation Reference Size (MCRS) is represented as a red line to provide comparison (35mm).*

- Figure 7 shows the length distribution of the Manila clam population survey in Poole Harbour in 2024 compared to 2023 and 2022. The average size of Manila clam has stayed consistently above MCRS (35mm and represented by a dashed red line) for the last 3 years of surveys at 37.2mm (2024), 38.15mm (2023) and 36.55mm (2022).

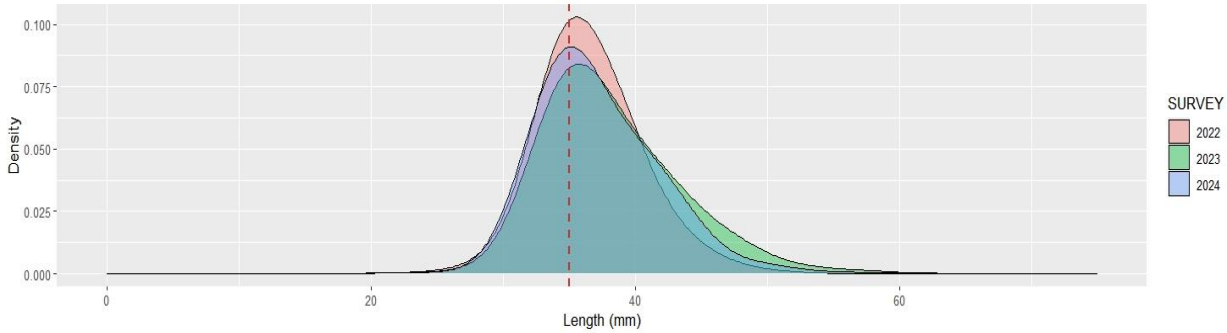

***Figure 7.** The length distribution of Manila clam in 2024 (blue) compared to the 2023 dataset (green) and 2022 dataset (red). The corresponding Minimum Conservation References Size (MCRS) has been included (35mm), represented by a red dashed line.*

3.1.2 Common cockle

- For 2024, the average size of cockle varied from 36mm at site 22 (n=47) to 25mm at site 19(2) (n=42) (*Figure 8)*.
- All sites had an average length above the MCRS length (23.8mm).
- There was no common cockle obtained from Site 18(2) during the 2024 survey.

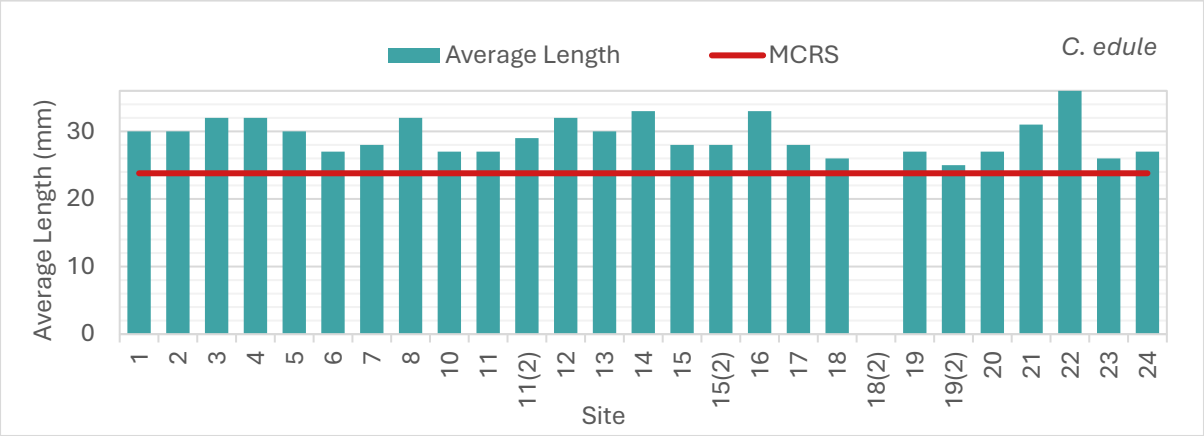

***Figure 8**. The average length of common cockle in each of the surveyed sites in the Poole Harbour Dredge Bivalve Survey 2024. The corresponding Minimum Conservation Reference Size (MCRS) is represented as a red line to provide comparison (23.8mm)*

- Figure 9 shows the length distribution of common cockle within 2024 dataset in comparison to 2022 and 2023. The average size of common cockle has stayed consistently above MCRS (23.8mm and represented by a red dashed line) for the last three surveys at 29.8mm (2024), 29.3mm (2023) and 29.0mm (2022).

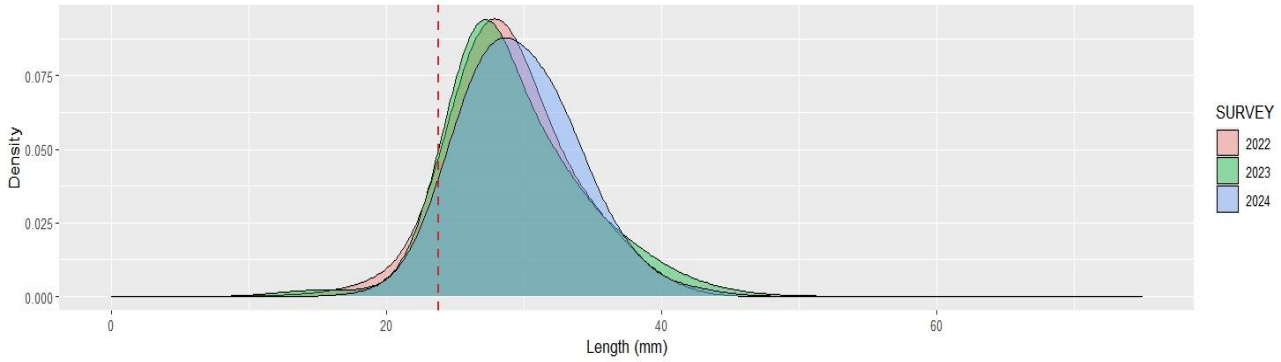

***Figure 9.** The length distribution of the common cockle sample population in 2024 (blue) compared to the 2023 dataset (green) and 2022 dataset (red). The corresponding Minimum Conservation References Size (MCRS) has been included (23.8mm), represented by a red dashed line.*

3.2 Catch Per Unit Effort (CPUE)

The 2024 dataset has been analysed for any statistical differences between sites, while also to compare to data from the previous two survey years, 2022 and 2023. Statistical analyses were performed using a non-parametric Kruskal-Wallis test with subsequent Dunn's test.

3.2.1 Manila Clam

- Catch zones 7, 6 and Holes Bay showed the highest average total Catch Per Unit Effort in the 2024 survey (185kg/m/hr, 183kg/m/hr and 213kg/m/hr, respectively).
- Holes Bay and zone 6 showed the highest average CPUE of above MCRS Manila clam (164kg/m/hr and 138kg/m/hr). All zones showed a greater CPUE of above MCRS Manila clam in comparison to

below MCRS CPUE, with the exception of Zone 7, 86.9kg/m/hr and 97.65kg/m/hr, respectively which was also the highest value for CPUE below MCRS across all catch zones (*Figure 10*).

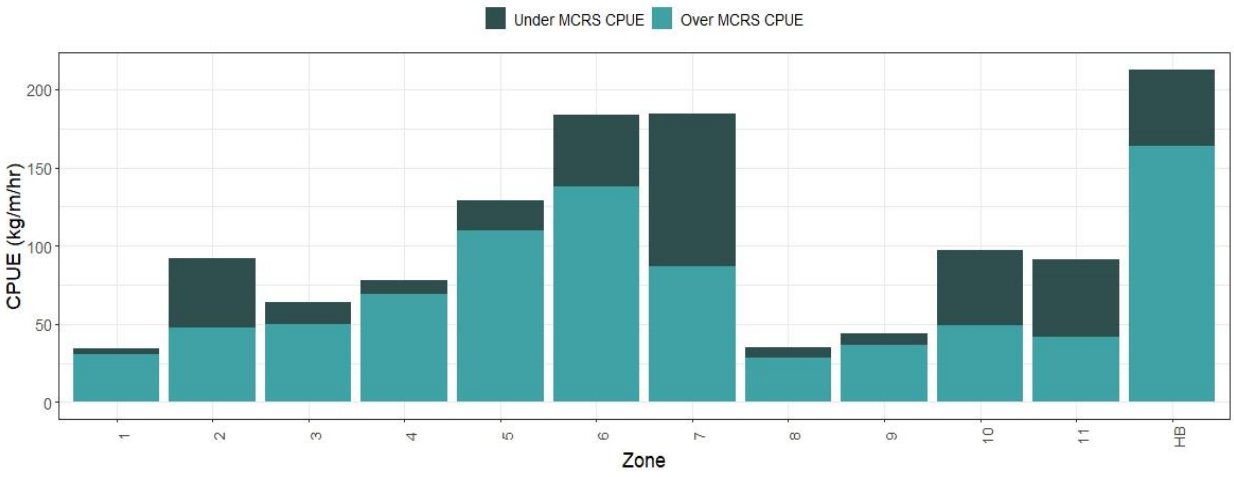

Figure 10. *The average Catch Per Unit Effort for Manila clam in each zone surveyed within the Poole Harbour Bivalve Survey 2024. Bars represented average total CPUE which is also divided into above and below MCRS CPUE (light and dark blue representatively).*

- Statistical analysis showed no significant differences between catch zones for total CPUE, above MCRS CPUE and below MCRS CPUE within the 2024 dataset ($p>0.05$).
- Although there was some variation across years, statistical comparisons between the last three survey years for each zone (2022- 2024) showed no significant difference for total CPUE between years ($p>0.05$) (*Figure 11*).
- CPUE above MCRS also showed no significant difference between years ($p>0.05$). This suggests that over the last 3 surveys, the Manila clam CPUE has remained stable.
- Analysis of CPUE in Zone 1 showed the 2024 dataset to have greater below MCRS CPUE when compared to both 2022 and 2023 (both p values were $p<0.05$). Although, all other comparisons of CPUE under MCRS showed no significant differences between years ($p>0.05$).

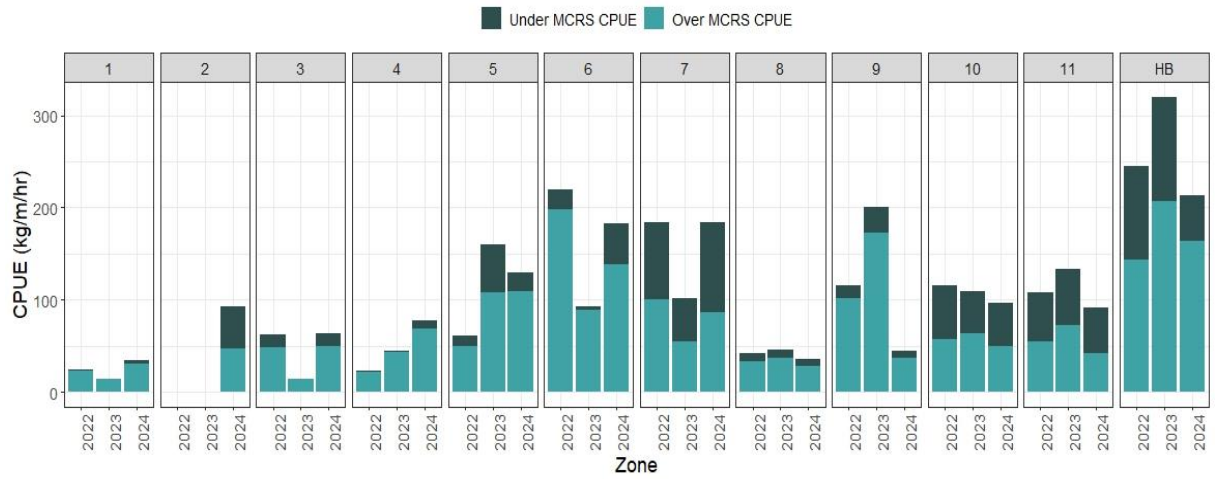

Figure 11. *Average Catch per Unit Effort (CPUE) of Manila clam, expressed as kg of shellfish per metre of dredge per hour. Dark blue bars represent CPUE under MCRS for Manila clam (35mm), and light blue bars represent the CPUE above MCRS. Data has been grouped into the catch zones 1-11 and Holes Bay (HB) and shows data for the three most recent years of the survey (2022-24).*

3.2.2 Common cockle

- Within the 2024 dataset, catch zone 3 showed the highest average total CPUE, followed by Zone 8 and Zone 4 (346kg/m/hr, 48kg/m/hr and 48kg/m/hr, respectively). Zone 3 also showed the highest average CPUE of above MCRS cockle (341kg/m/hr).
- All zones had a greater average CPUE of above MCRS compared to under MCRS *(Figure 12)*.

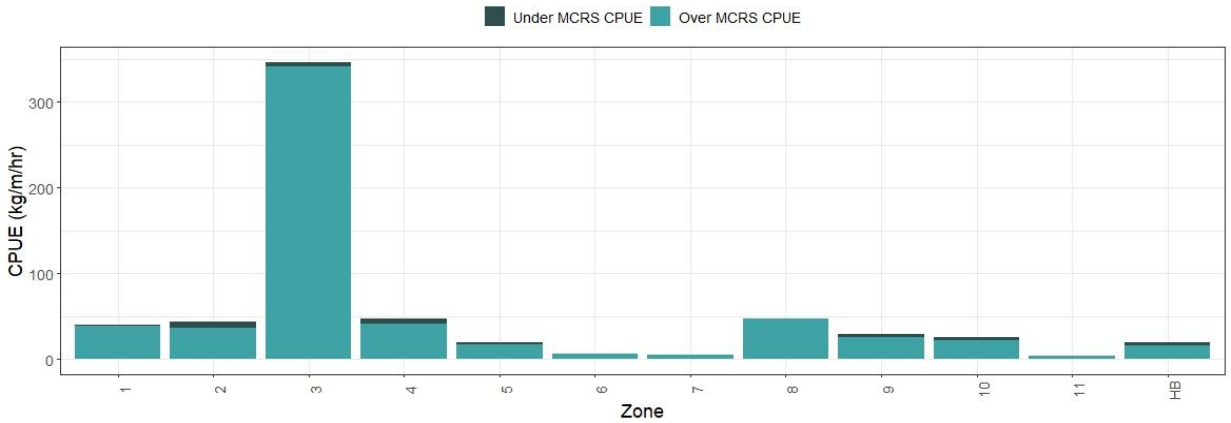

Figure 12. *The average Catch Per Unit Effort for common cockle in each zone surveyed within the Poole Harbour Bivalve Survey 2024. Bars represented average total CPUE which is also divided into above and below MCRS CPUE (light and dark blue representatively).*

- There was no significant difference between total CPUE or CPUE below MCRS between sites for 2024 ($p>0.05$).
- Statistical analysis showed Zone 3 to have a significantly higher average CPUE of above MCRS when compared with zones 6,7,10,11 and HB (all p values <0.05). Zone 11 had significantly lower CPUE above MCRS than zones 1,3,4 and 8 (all p values <0.05).
- Statistical comparison over the last 3 surveys (2022-2024) found no significant differences between total CPUE or above MCRS cockle CPUE between years (*Figure 13)*.

- Holes Bay showed a significantly higher CPUE under MCRS in 2024 than in 2023 ($p<0.05$) and there was a significantly lower CPUE under MCRS for cockles in zone 11 in the 2024 survey compared to 2023 ($p<0.05$).

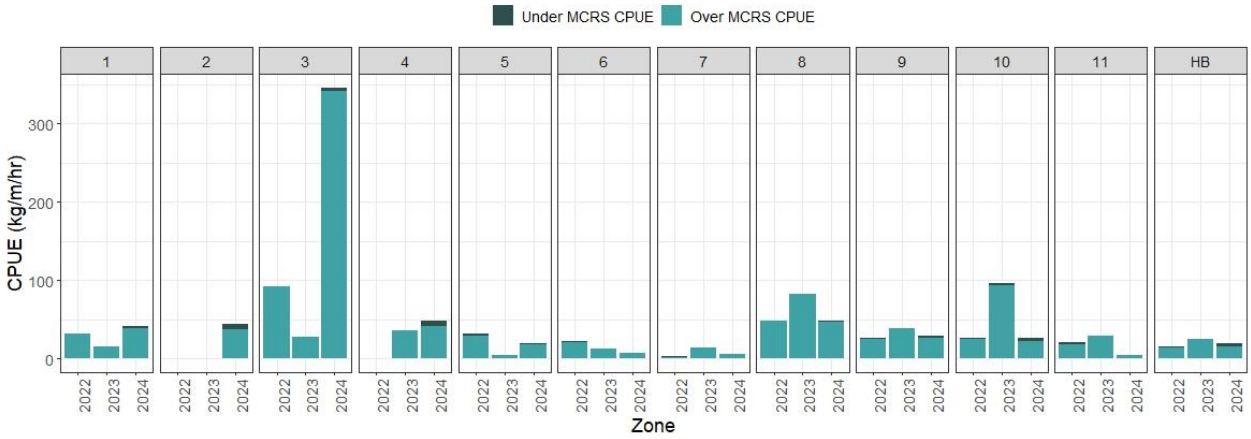

Figure 13. *Average Catch per Unit Effort (CPUE) of common cockle, expressed as kg of shellfish per metre of dredge per hour. Dark blue bars represent CPUE under MCRS for common cockle (23.8mmmm), and light blue bars represent the CPUE above MCRS. Data has been grouped into the catch zones 1-11 and Holes Bay (HB) and shows data for the three most recent years of the survey (2022-24).*

3.3 Seasonal Catch Data

Quantities of Manila clam and common cockle caught each month by the fishery for the 2021, 2022 and 2023 fishing seasons are shown in Figure 14 and Figure 15, respectively. The fishing season runs from 25th May to 23rd December each year, therefore it should be noted than catch weight (kg) for May represents only a 5-day fishing period and December a 23-day fishing period.

3.3.1 Manila clam

- Total landings of Manila clam within the 2021 season was 493.1 tonnes. There was a slight decline in the 2022 season to 337.3 tonnes, which has shown to increased again in the most recent 2023 season, to 474.7 tonnes.
- Statistical analysis revealed no significant differences in the total landings of Manila clam between the 2021, 2022 and 2023 seasons ($p>0.05$).
- Seasonal trends followed previous years', which showed an increase in landings in the mid-summer months followed by a slow decline towards the end of the fishing season in December.
- In the 2023 season, Manila clam landings peaked in July, at 95.9 tonnes.
- Statistical testing revealed no significant differences in the monthly landings of Manila clam between 2021 and 2023 (all p values>0.05).

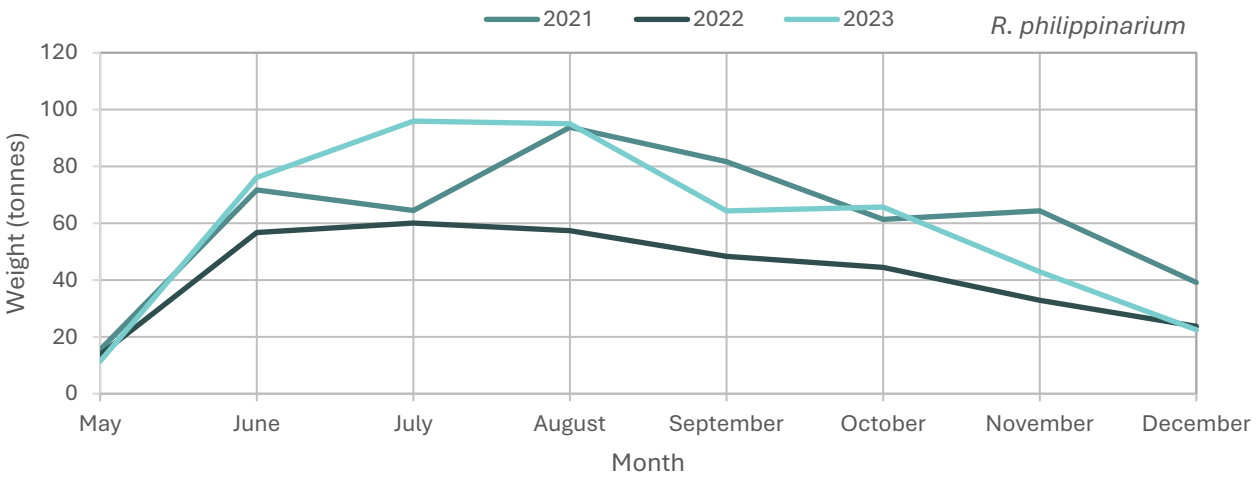

Figure 14. *The monthly total catch (tonnes) of Manila clam submitted in catch returns from permit holders in the Poole Harbour Dredge Fishery for the 2021, 2022 and 2023 seasons.*

3.3.2 Common cockle

- The total weight of common cockle landed in 2024 was greater than the previous two seasons; 44.6t in 2023, compared to 34.2t in 2022 and 34.7t in 2021.
- However, statistical analysis showed no significant differences in total landings of cockles between the 2021, 2022 and 2023 seasons ($p>0.05$).
- Seasonal trends followed previous years' trends of increased landings in the mid-summer months, however there is a clear spike in landings in October of 2023 compared to previous seasons. Although, cockle landings peaked in October 2023 at 10.8t, there was no significant difference in monthly catch between 2021-2023 (all p values >0.05).

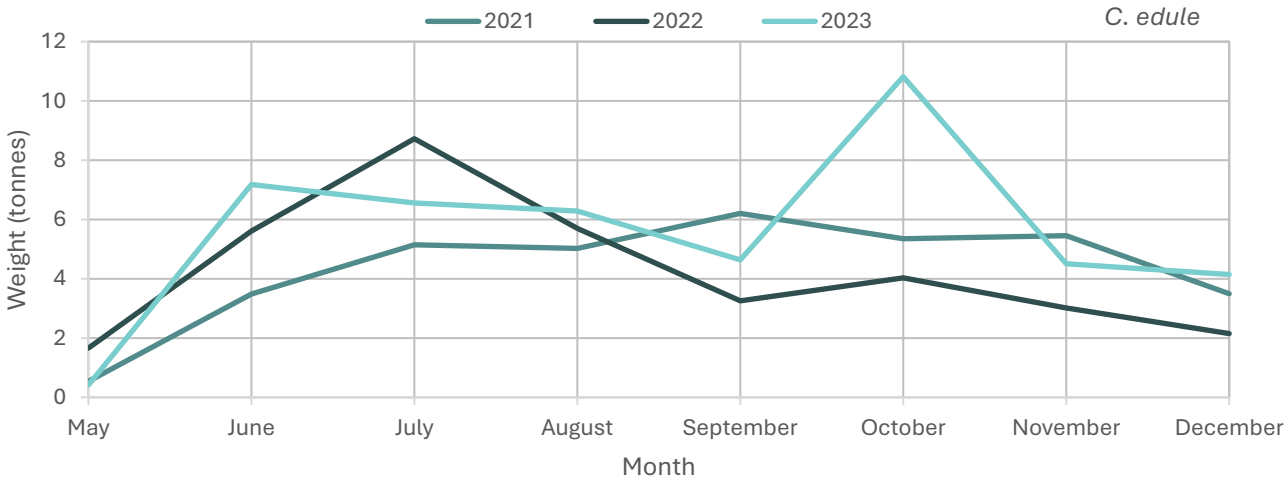

Figure 15*. The monthly total catch (tonnes) of common cockle submitted in catch returns from permit holders in the Poole Harbour Dredge Fishery for the 2021, 2022 and 2023 seasons.*

3.4 Zonal Catch Data

Since 2019, fishers have been required to report which fishing zones have been fished each day. This provides zonal application to catch data that can then be related to the catch zone analysis of the survey CPUE data where required. Note that there is no catch data for the Holes Bay as this is a prohibited area year-round for the dredge fishery.

3.4.1 Manila clam

- Zones 8,10 and 11 have consistently been favourable fishing grounds for Manila clam over the last three seasons (*Figure 16*).
- After a decline in quantities in these zones in the 2022 season, landings in 2023 increased for zones 8, 10 and 11 (total landings for 2023 at 182.5t, 162.8t and 46.4t, respectively).
- Statistical analysis showed significant differences in landings data between 2021-2023 in zones 1 and 8 ($p>0.05$). A Dunns test revealed quantity landed in zone 8 was significantly lower in 2022 than in 2021, however there was a significant increase between 2022 and 2023 ($p<0.05$). There was also a significant increase in quantity landed in zone 1 between 2022 and 2023 ($p<0.01$).

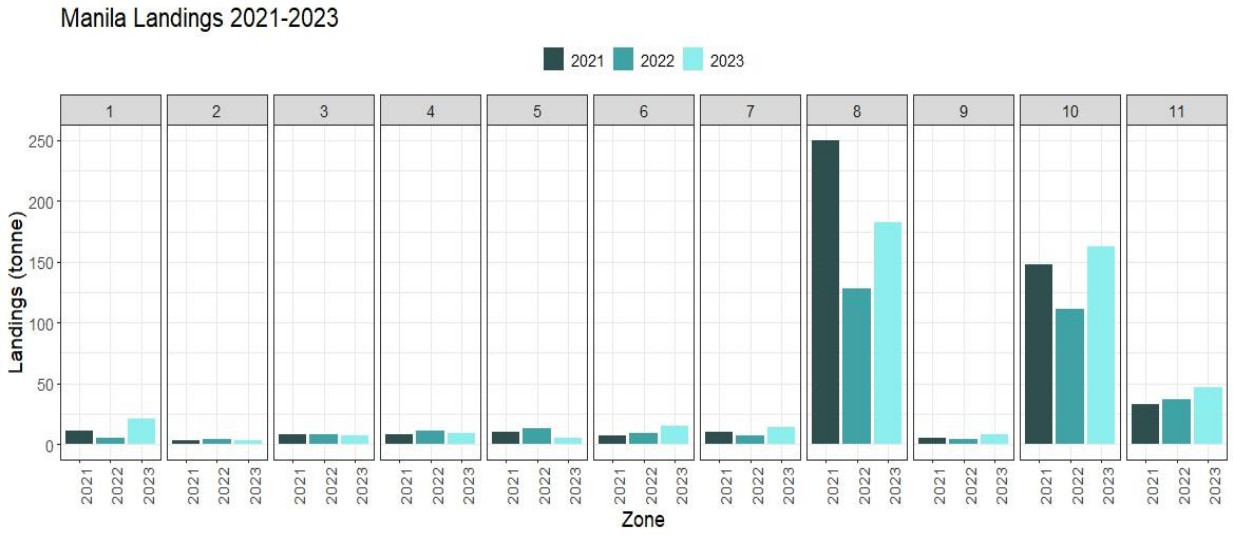

Figure 16. *Landings of Manila clam between 2021-2023. Information was gathered by submitted catch returned from permit holders in the Poole Harbour Dredge Fishery. Zonal distribution of catch has been categorised by year.*

3.4.2 Common cockle

- Zones 3, 4 and 8 were the favourable fishing grounds for common cockle within the 2023 fishing season (17.7 t, 4t and 13.5t, respectively) *(Figure 17)*.
- Landings in zone 3 increased in 2023 compared to previous years, overtaking zone 8 as the favourable catch zone, however statistical analysis showed no significant differences in landings across the 2021-2023 fishing seasons ($p>0.05$).

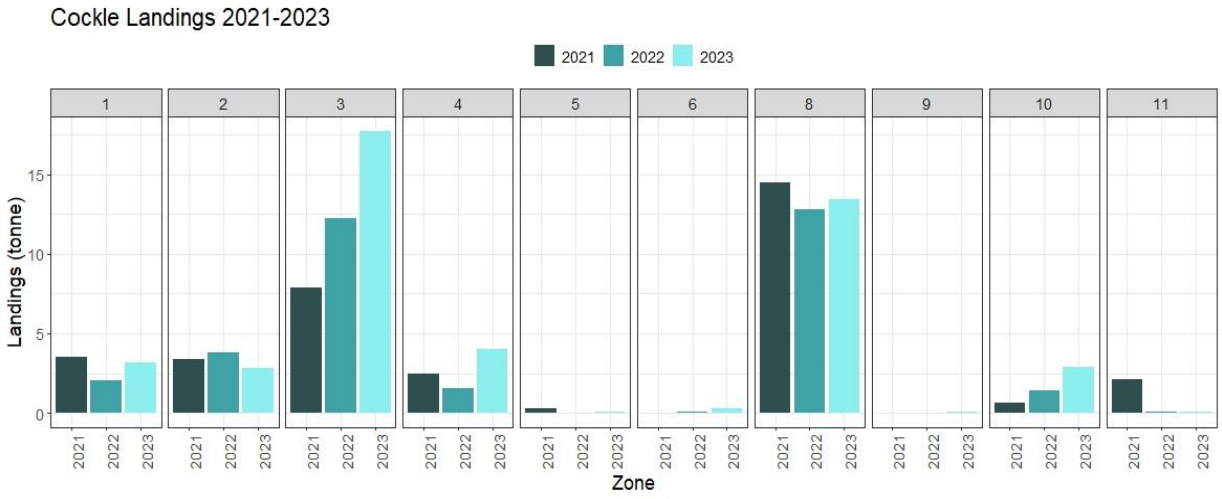

***Figure 17**. Landings of common cockle from the Poole Harbour Dredge fishery between the years 2021-2023. Information was gathered by submitted catch returns from permit holders in the Poole Harbour Dredge Fishery. Zonal distribution of catch has been categorised by year.*

4.0 Discussion

- Quantifying CPUE from survey results and quantifying landings data provided by fishers allows the results to be analysed against level of fishing. Applying this to the 11 catch zones, introduced since 2019, allows identification of any zonal changes which could be used to inform management.
- Higher CPUE outputs reflect environmental stimuli driving habitation for both species. Higher CPUE of Manila clam are seen in muddy and fine-grounded sediment areas of Inner Keysworth, Wych and Middlebere Lake and Holton Mere, whereas high CPUE of cockles are found in sandy and coarse sediments displayed in sites such as Blood Alley, Jerry's Point and Whitley Lake. The preferred locations for dredging within the fishery reflect those areas which show the higher CPUE outputs.
- The quantities of cockle landed each season are consistently lower than Manila clam landings. This is due to market preferences and economic value of each species where Manila clam is the favoured species.
- Sites 23 and 24 in Holes Bay display high CPUE of Manila clams. The combination of a permanent fishing closure within Holes Bay since 2015, alongside preferred conditions for Manila clam growth, may be causing the results seen.
- The last three years' landings data and CPUE for Manila do not show any statistical variations, indicating that clam dredging for Manila within the Poole Harbour Dredge Fishery is consistent and Manila stocks remain stable. It has been observed that the site with the highest landings also shows some of the lowest CPUE levels (Zone 8). However, it is important to note that the survey is undertaken in April, only three months post the season closing and following cold months where growth of individuals is limited. The lack of significant difference between years suggests that, at present, the fishery is able to support similar (although fluctuating) levels of fishing each year. Southern IFCA monitor trends in the data to

determine any changes in stock levels seen between years at a catch zone level, which can help inform the management of the fishery to ensure continued sustainable practice.

- Figure 18 A, B and C shows that the length distribution of Manila clam within the most fished zones (8, 10 and 11) has also declined slightly since 2022, towards a smaller average size, however there is no significant difference between length distribution across years ($p>0.05$) suggesting that this a trend to monitor but does not indicate a significant change which requires further investigation. At this point, it is not possible to link the trend observed to fishing pressure, but fishing pressure is a component that can still be tracked through the yearly surveys. The shift in size is not consistent across all locations, and for some sites, it varies more between years.

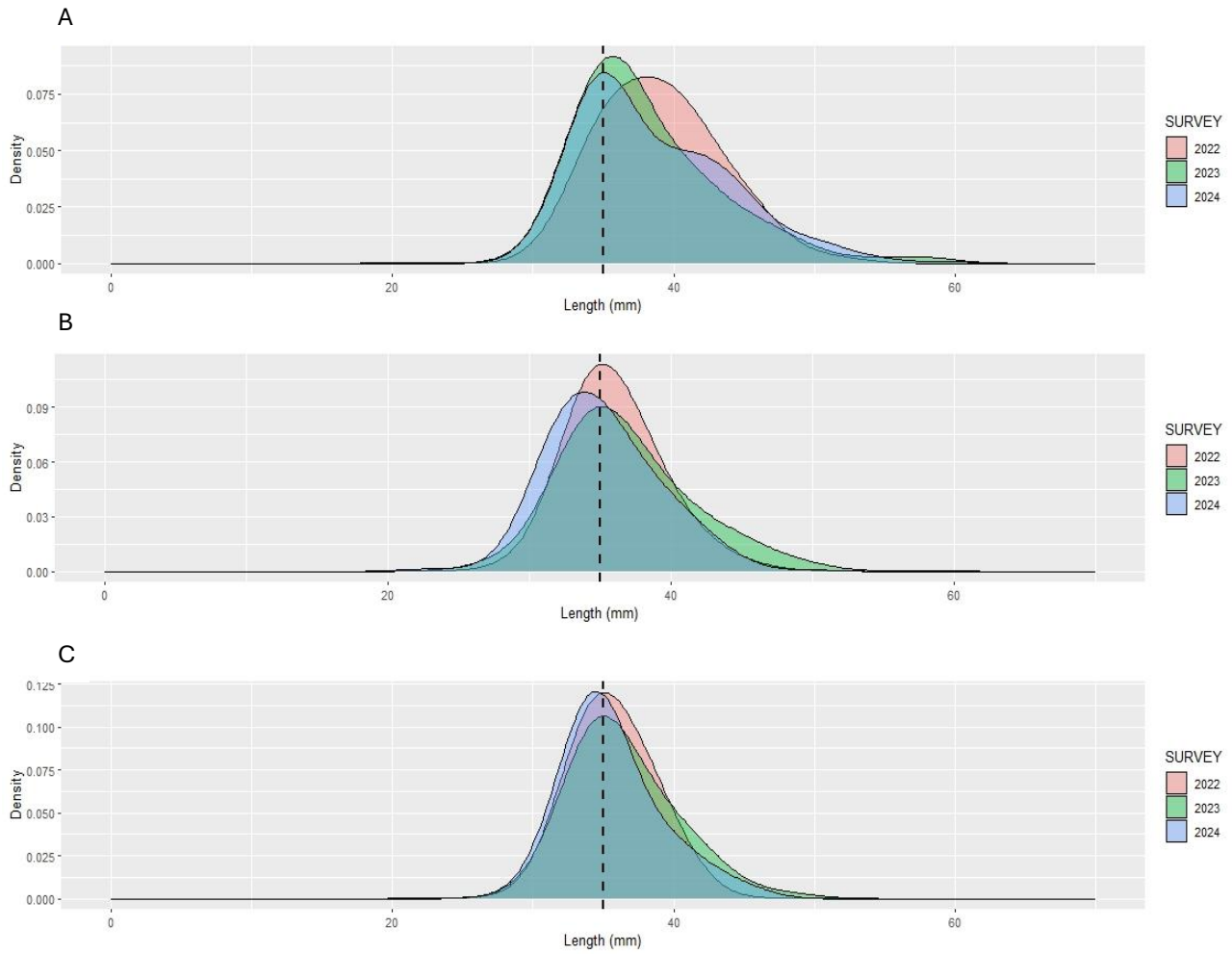

***Figure 18 A, B and C**. The length distribution of Manila clam at zone 8 (A), zone 10 (B) and zone 11(C) over the last three years. 2022 is represented in red, 2023 in green and the 2024 dataset in blue.*

- Statistical analysis of cockle landing data showed no significant changes in landings over the last three fishing seasons, meanwhile increase in landings of 10 tonnes during the 2023 season suggests the state of cockle population remains stable. Comparably, landings from Zone 3 have gradually increased over the last 3 years, making it the most popular fishing ground of the 2023 fishing season. Although a zonal analysis of the 2023 dataset reveals a substantial variation in zone 3 when compared to other zones, a comparison of landings or CPUE over the previous three years does not reveal any significant variances. Both CPUE and landings in other productive fishing areas continue to be consistent.

- While the CPUE and landings within zone 3 has increased, the length of cockles examined in the 2024 survey showed a shift towards a smaller average size since 2022. Figure 19 A, B and C shows the length distribution of common cockle collected in the most popular fishing grounds of the 2023 season, compared to the last 2 years. The shift in size is not consistent between all sites and for some sites is more varied across years, therefore at this stage it is not possible to attribute the pattern seen to fishing pressure but is a factor that can continue to be monitored through the annual surveys.

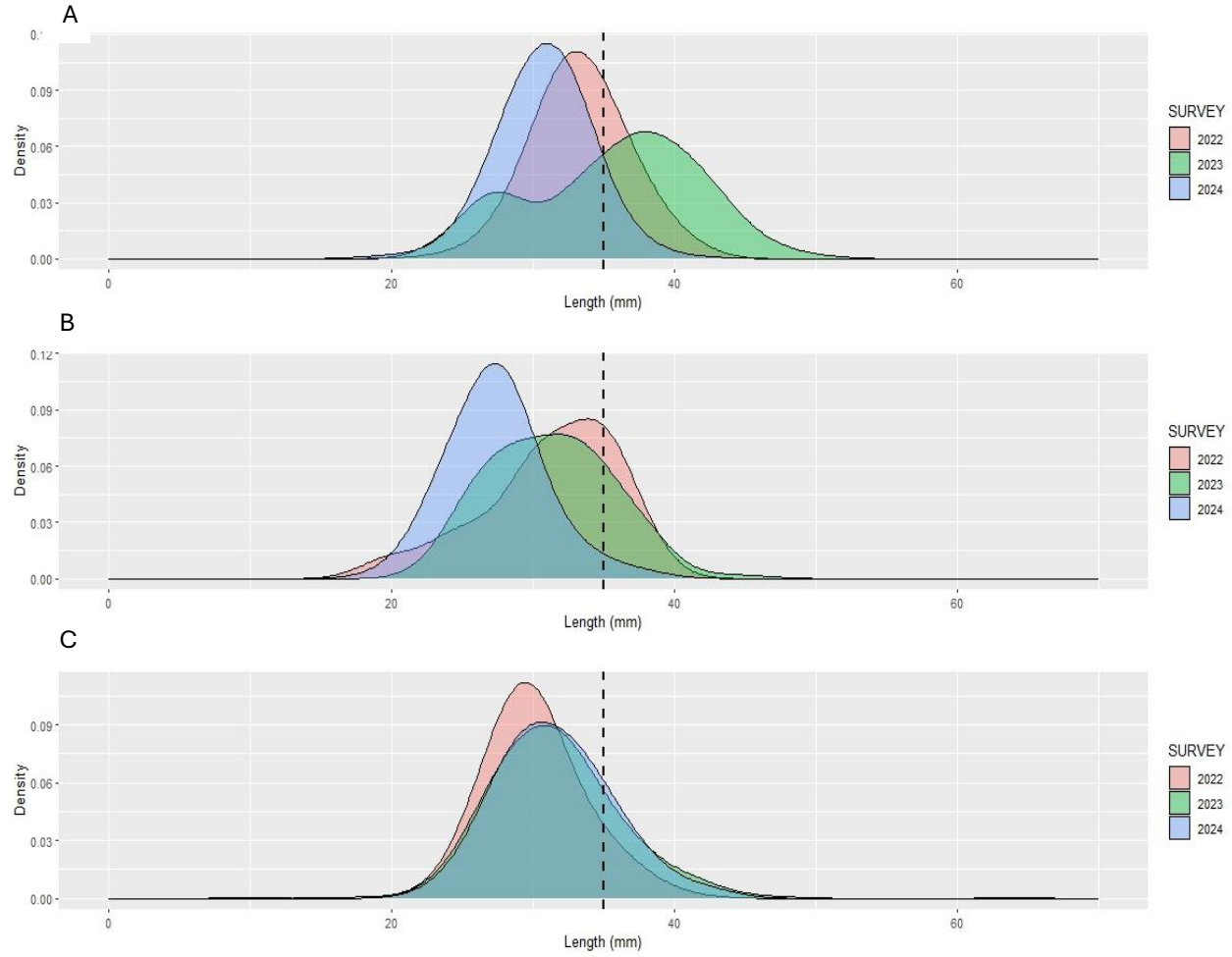

***Figure 18 A, B and C**. The length distribution of common cockle in Zone 3 (A), zone 4 (B) and Zone 8 (C) over the last three survey years, 2022 (red), 2023 (green) and 2024 (blue).*

- The discrepancies in average size patterns between the Manila clam and common cockle compared to their respective landing sizes seen in this study are likely to be influenced by the sampling strategy and growth habits of both species.
- The size of the Manila clam sample populations varied more than the cockle population, which was mostly above the MCRS for the species. Previous studies and zonal observations have showed that Manila clam grow differently depending on the region it inhabits within the Harbour; some individuals are seen to grow along the widest axis and remain thin, whereas other subpopulations grow in depth but remain narrow in length. Therefore, thicker Manila clams will be retained by the dredge regardless of if the length is above or below the MCRS. In contradiction, cockles are seen to grow more equally throughout their structure, meaning less undersized individuals are unintentionally caught in the dredge. This, alongside potential impacts from the differences in fishing pressures between species may

therefore affect the species' relative size distributions. Therefore, a higher proportion of undersize Manila clams can be seen in the CPUE outputs.

5. Conclusion

- The 2024 Poole Harbour Bivalve Survey has provided data which enables an assessment to be made of the stocks of the main commercially harvested species, Manila clam and common cockle, and for data to be compared to previous survey years.
- The results indicate that the harvestable populations of both species remain stable with CPUE showing either no significant differences between years or, for common cockle, an increase in CPUE in the last two survey years.
- Catch levels also remain consistent with no significant differences between years and no specific effects of catch levels can be discerned in the survey results.
- Length frequency also remains stable with the majority of sites showing an average size at or above the species MCRS. The exceptions to this are likely explained in the majority by environmental variables and growth allometry, although there may be an influence of fishing activity in the areas with the highest effort during the season. However, this cannot be quantified and the variation in results suggest this would on be the main influencing factor at this stage.
- The populations of Manila clam and common cockle in Poole Harbour appear to be robust to the current level of fishing pressure with harvesting remaining sustainable in respect to stock levels.
- The survey will continue to be undertaken annually to extend the timeseries dataset which will facilitate being able to work towards identifying potential empirical reference points for stocks of Manila clam and common cockle, to further develop the work on this fishery in terms of monitoring stock levels and fishing effort to ensure sustainable practice.

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