Southern IFCA Survey Report

Solent Bivalve Survey 2024

1. Introduction

The Solent Bivalve Survey runs twice a year to assess the distribution and abundance of key bivalve species in three Bivalve Management Areas (BMA) defined under the Solent Dredge Permit Byelaw, namely Area 4 (Southampton Water), Area 5 (Portsmouth Harbour), and Area 6 (Langstone Harbour). The spring survey provides information on the stock following the closure of the fishing season and the autumn survey on the stock prior to the opening of the fishing season in November.

The survey focuses on the two main bivalve species harvested commercially in these BMAs, the Manila clam (*Ruditapes philippinarum*) and the Common cockle (*Cerastoderma edule*). The results from the survey provide data which can be used as a baseline against which to monitor trends in the stock levels of these species in the Solent, which informs management under the Solent Dredge Permit Fishery.

2. Methodology

In 2024, the Spring survey took place from the 11th March to the 13th March and the Autumn survey took place from the 2nd October to the 4th October, using three local fishing vessels familiar with the BMA within which they were sampling. On each vessel, the same box clam dredge was deployed, which is of the same class as that used in normal fishing practice (Figure 1).

Each management area has defined survey beds which represent areas of different fishing intensity and habitat type. The areas surveyed also span a range of classifications for the shellfish beds as defined by the Food Standards Agency. The identification of survey beds provides a general area in which to sample, with the identification of suitable tow locations for each area made during the survey, due to its dependence on factors including weather, tide, obstructions to dredging etc. As such, if unforeseen circumstances dictate, tows may sometimes not fully overlap with the survey beds. The tow locations for each surveyed shellfish bed are shown in Figures 2 to 4.

Shellfish sampled were obtained using the following methodology:

- Three dredge tows, timed at two minutes, were conducted within each survey bed of the wider BMA.
- After two minutes the dredge was brought inboard and any bivalves within it were retained.
- The presence of difference sediment types and other habitat identifiers including weed and Slipper limpet (*Crepidula fornicata*) were recorded, with abundance scored on a scale of 1 – 5, 5 being most abundant.
- Bivalves were identified to species level and the first 50 individuals of each species were measured along the widest axis (length) to the nearest millimetre.

Figure 1 Box dredge used during the Solent Bivalve survey.

- Manila clams and Common cockles were separated into equal to/above or below their Minimum Conservation Reference Size (MCRS), 35mm and 23.8mm respectively, and then weighed.
- All sampled were returned to the sea in the same BMA in areas with the same shellfish classification as that from which they had been taken.

2.1. Statistical Analysis

- The sets of collected weight and length data were analysed first with a Kruskal-Wallis test to determine whether a difference in the averages of groups (e.g., the weight of Manila clam in each BMA) was present.
- If such a difference was found, the data set was then analysed using a Dunn's post-hoc test, which determines whether the difference in average was greater between the groups than the difference found within the groups.
    - E.g., whether there was a greater difference between the average weight of Manila clam between surveys than there was difference within the average weight of Manila clam sampled at sites within one specific year.
- Statistically significant results from the Dunn's post-hoc tests indicate changes in weight or length that may be beyond the population's natural size/growth variation, and could be linked to a range of external factors, such as environmental conditions, recruitment success, or population exploitation.
- Significant results are expressed as either $p < 0.05$ or $p < 0.01$, an indication as to the strength of the significant change, with $p < 0.01$ indicating a stronger change.

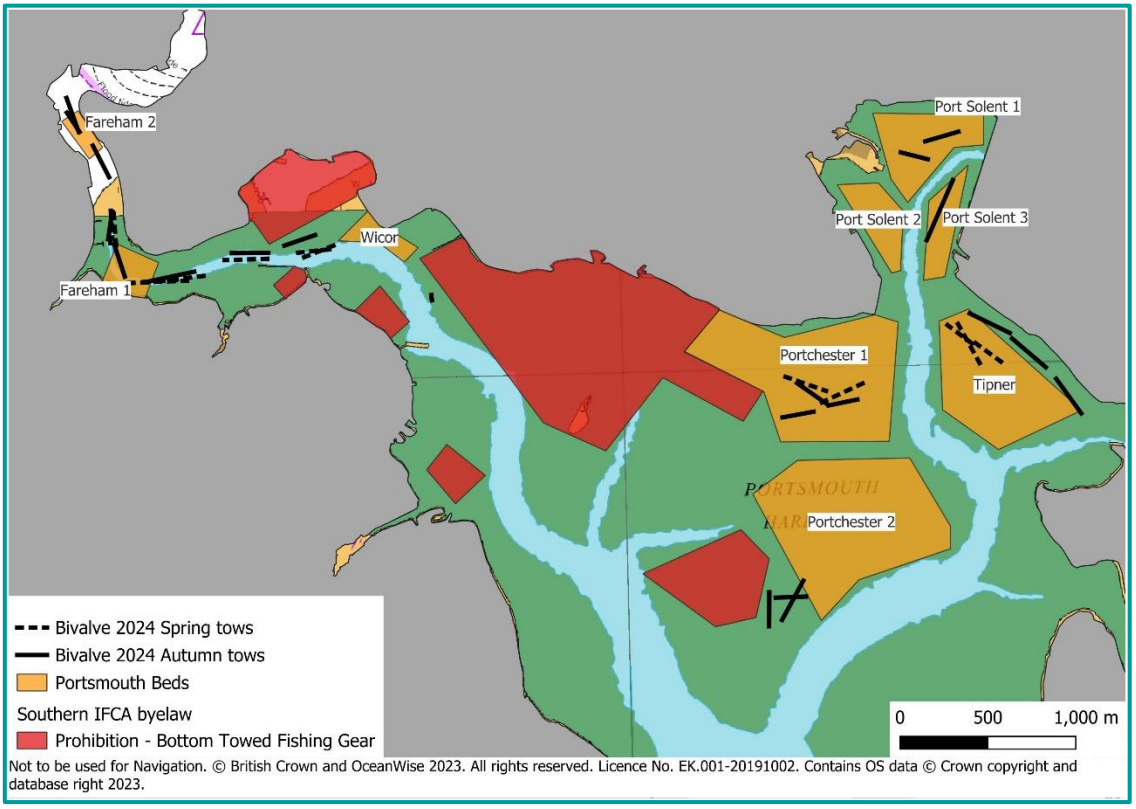

Figure 2: The tow paths undertaken during both the Spring and Autumn 2024 surveys within Portsmouth Harbour.

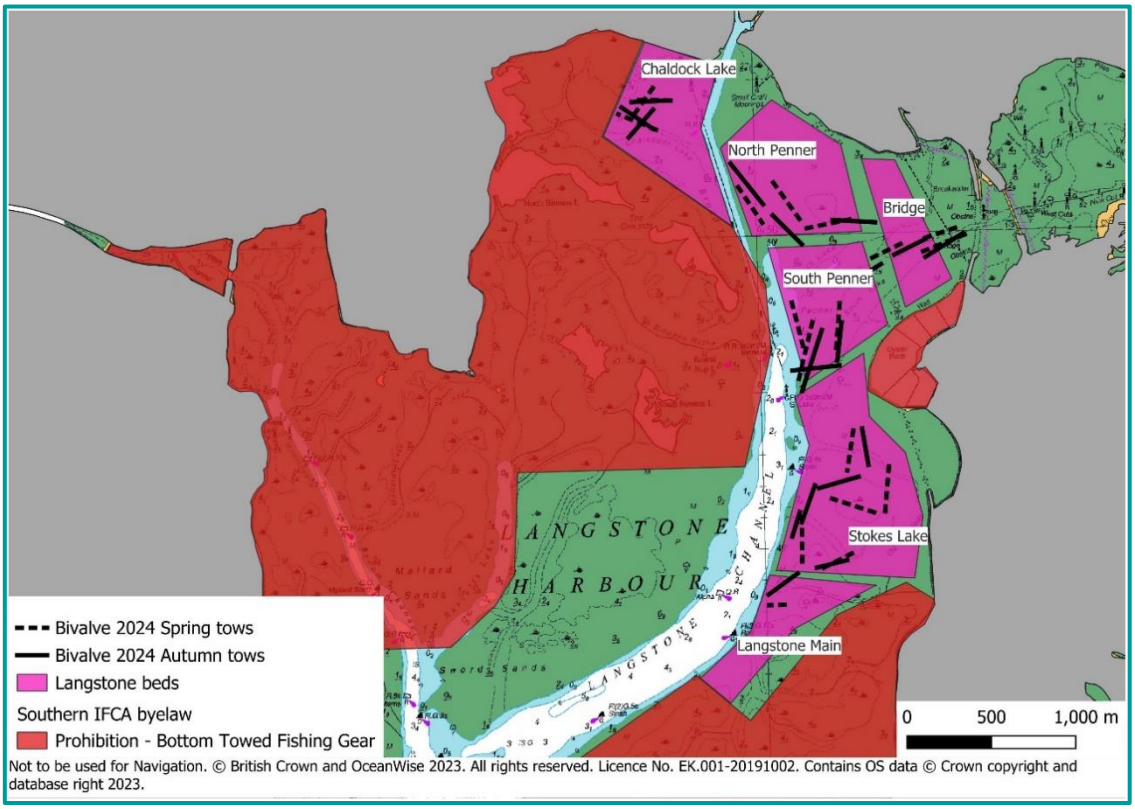

Figure 3: The tow paths undertaken during both the Spring and Autumn 2024 surveys within Langstone Harbour.

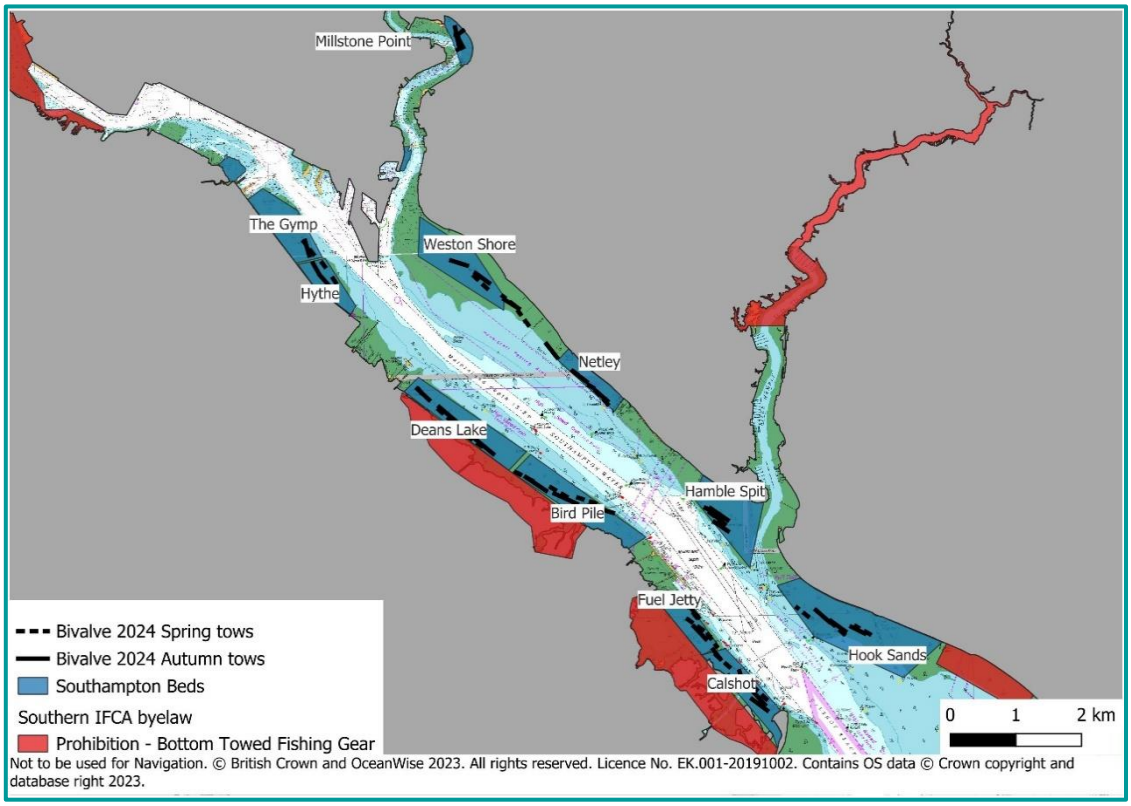

Figure 4: The tow paths undertaken during both the Spring and Autumn 2024 surveys within Southampton Water.

3. Results

The results of the survey focus on the two main commercial species, the Manila clam and the Common cockle.

Other species found during the survey in smaller quantities included the Pacific oyster (*Magallana gigas*), American Hard-Shelled clam (*Mercenaria mercenaria*), the Spiny cockle (*Acanthocardia aculeata*), and the Native oyster (*Ostrea edulis*).

3.1. Catch Per Unit Effort

Data on the abundance and distribution of Manila clam and Common cockle is presented as Catch Per Unit Effort (CPUE), defined as kg of shellfish per metre of dredge per hour. CPUE is provided for the species both equal to/above and below MCRS. The use of CPUE consistently between surveys allows for statistical comparisons to identify if there are any significant changes to the stock. CPUE results are provided for four key time periods through the year:

- Pre- and post- the fishing season (Autumn to Spring),
- Pre- and post- the closed season (Spring to Autumn),
- Between the Spring (post-season) surveys in the timeseries, and
- Between the Autumn (pre-season) surveys in the timeseries.

It should be noted that, given that the sampling method is size selective due to the spacing of bars on the box dredge, data for stock below MCRS will not be representative of the full composition of stock in these size classes, however consistency in survey methodology between years allows for comparisons.

The average CPUE values presented are the median value (the middle value in a range of sequential values), as this is the metric compared within Kruskal-Wallis tests (used when data is non-normally distributed).

3.1.1. Pre- and Post- the 23/24 Fishing Season Comparisons

CPUE data from Autumn 2023, and Spring 2024 has been compared to analyse changes to population levels during the fishery **open season or 'fishing period'.**

Manila Clam (From Autumn 2023 to Spring 2024)

- In **Southampton Water,** there was a **significant ($p < 0.05$) increase** from Autumn 2023 (4.17 kg m^{-1} hr^{-1}) to Spring 2024 (16.50 kg m^{-1} hr^{-11}) in CPUE for the population equal to/above MCRS. There was **no significant change** in CPUE for the population below MCRS (Figure 5).
- In **Portsmouth Harbour**, there was **no significant change** in CPUE for the population equal to/above or below MCRS.
- In **Langstone Harbour**, there was **no significant change** in CPUE for the population equal to/above or below MCRS.

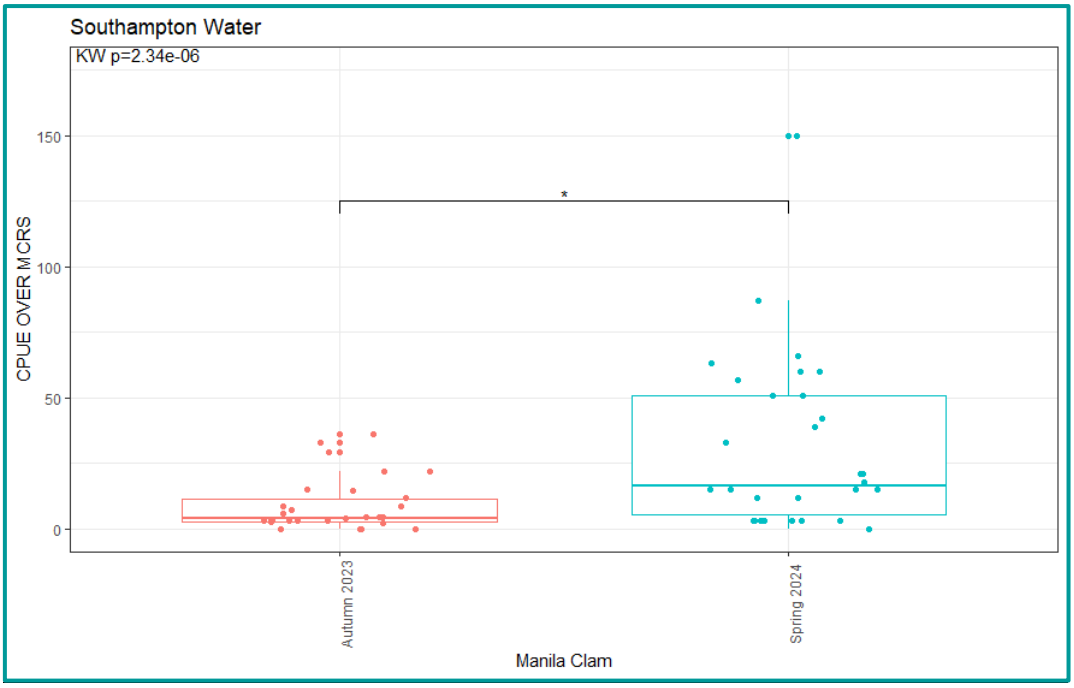

Figure 5: CPUE for the Manila Clam population equal to/above MCRS in Southampton Water on either side of the 2023/24 fishing season, which were found to be statistically significantly different ($p < 0.05$).

Common Cockle (From Autumn 2023 to Spring 2024)

- There was **no significant change** in CPUE for the population equal to/above or below MCRS in **Southampton Water, Portsmouth or Langstone Harbours.**

3.1.2. Pre- and Post- the 2024 Closed Season Comparisons

CPUE data from Spring 2024 and Autumn 2024 was compared to analyse changes to population levels during the fishery **closed season.**

Manila Clam (From Spring 2024 to Autumn 2024)

- There was **no significant change** in CPUE for the population equal to/above or below MCRS in **Southampton Water, Portsmouth or Langstone Harbours.**

Common Cockle (From Spring 2024 to Autumn 2024)

- There was **no significant change** in CPUE for the population equal to/above or below MCRS in **Southampton Water, Portsmouth or Langstone Harbours.**

3.1.3. Spring Survey (post-season) Comparisons

CPUE data for surveys carried out in the Spring, representing post-season conditions, has been compared between the survey years in order to monitor and compare the state of the population at the end of each fishing season.

For Manila clam CPUE data is available from 2018 to 2020 and 2022 to 2024, however data from Spring 2018 has been removed as no weight measurements were taken that year. For Common cockle CPUE data is available

from 2020 and 2022 to 2024, as weight data was not collected for Common cockle prior to 2020. Please note that there is no survey data available from Spring 2021 due to the Covid-19 pandemic.

Manila Clam (Between Spring Surveys)

- In **Southampton Water**, a **significant increase ($p < 0.05$)** in CPUE was found between:
  - The population equal to/above MCRS from Spring 2023 (6.00 kg m^{-1} hr^{-1}) to Spring 2024 (16.50 kg m^{-1} hr^{-1}) (Figure 6),
  - The population below MCRS from Spring 2023 (3.00 kg m^{-1} hr^{-1}) to Spring 2024 (21.00 kg m^{-1} hr^{-1}) (Figure 7).
- In **Portsmouth Harbour**, there was **no significant change** in CPUE for the population equal to/above or below MCRS for any Spring survey in comparison to Spring 2024.
- In **Langstone Harbour**, there was n**o significant change** in CPUE for the population equal to/above or below MCRS for any Spring survey in comparison to Spring 2024.

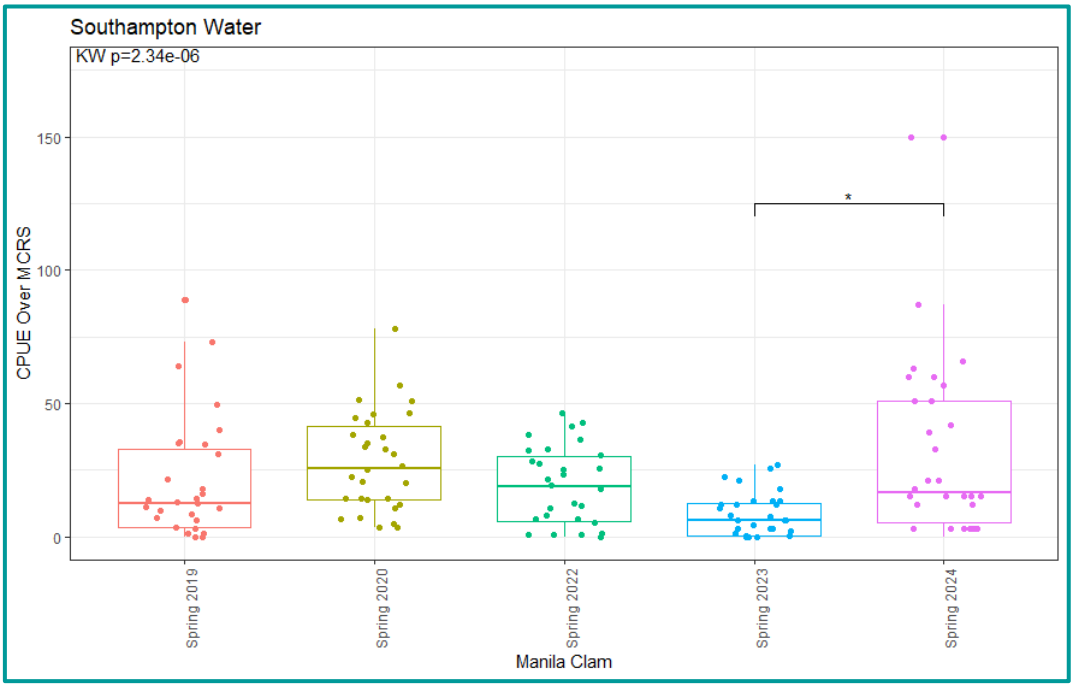

Figure 6: CPUE of the Manila Clam population equal to/above MCRS in Southampton Water for the spring surveys with available weight data from 2019 to 2024, where a statistically significant increase was found between 2023 and 2024 ($p < 0.05$).

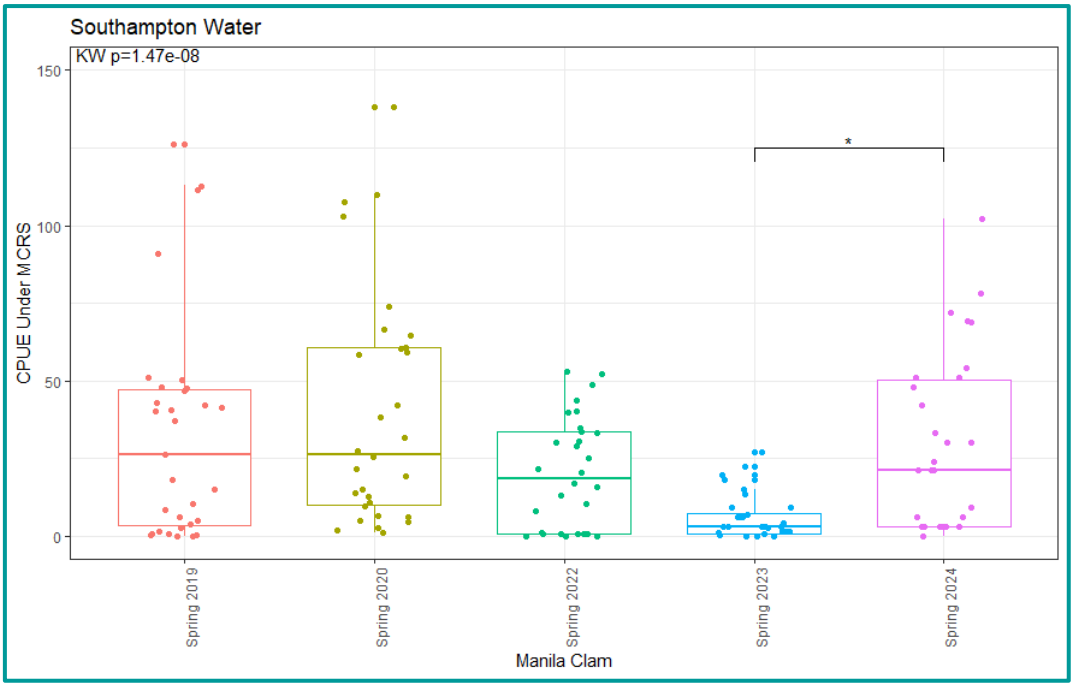

Figure 7: CPUE of the Manila Clam population below MCRS in Southampton Water for the spring surveys with available weight data from 2019 to 2024, where a statistically significant increase was found between 2023 and 2024 ($p < 0.05$).

Common Cockle (Between Spring Surveys)

- In **Southampton Water**, there was **no significant change** in CPUE for the population equal to/above or below MCRS for any of the Spring surveys in comparison to Spring 2024.
- In **Portsmouth Harbour**, there were **significant ($p < 0.05$) decreases** in CPUE between:
    - The population equal to/above MCRS between Spring 2020 (18.90 kg m^{-1} hr^{-1}) and Spring 2024 (1.50 kg m^{-1} hr^{-1}) (Figure 8),
    - The population equal to/above MCRS between Spring 2022 (41.40 kg m^{-1} hr^{-1}) and Spring 2024 (1.50 kg m^{-1} hr^{-1}) (Figure 8),
    - The population below MCRS between the Spring 2020 (4.07 kg m^{-1} hr^{-1}) and Spring 2024 (0.00 kg m^{-1} h^{-1}) (Figure 9),
    - The population below MCRS between the Spring 2022 (1.80 kg m^{-1} hr^{-1}) and Spring 2024 (0.00 kg m^{-1} hr^{-1}) (Figure 9),
    - The population below MCRS between the Spring 2023 (4.50 kg m^{-1} hr^{-1}) and Spring 2024 (0.00 kg m^{-1} hr^{-1}) (Figure 9).
    - For Spring 2024, the median value in Portsmouth Harbour of 0.00 kg m^{-1} hr^{-1} is informed by a data range from 0.00 kg m^{-1} hr^{-1} to 1.5 kg m^{-1} hr^{-1}.
- In **Langstone Harbour**, there was a **significant ($p < 0.01$) decrease** in average CPUE for the population equal to/above MCRS from Spring 2022 (9.00 kg m^{-1} hr^{-1}) to Spring 2024 (0.00 kg m^{-1} hr^{-1}) (Figure 10).
    - For Spring 2024, the median value in Langstone Harbour of 0.00 kg m^{-1} hr^{-1} is informed by a data range from 0.00 kg m^{-1} hr^{-1} to 3.00 kg m^{-1} hr^{-1}.

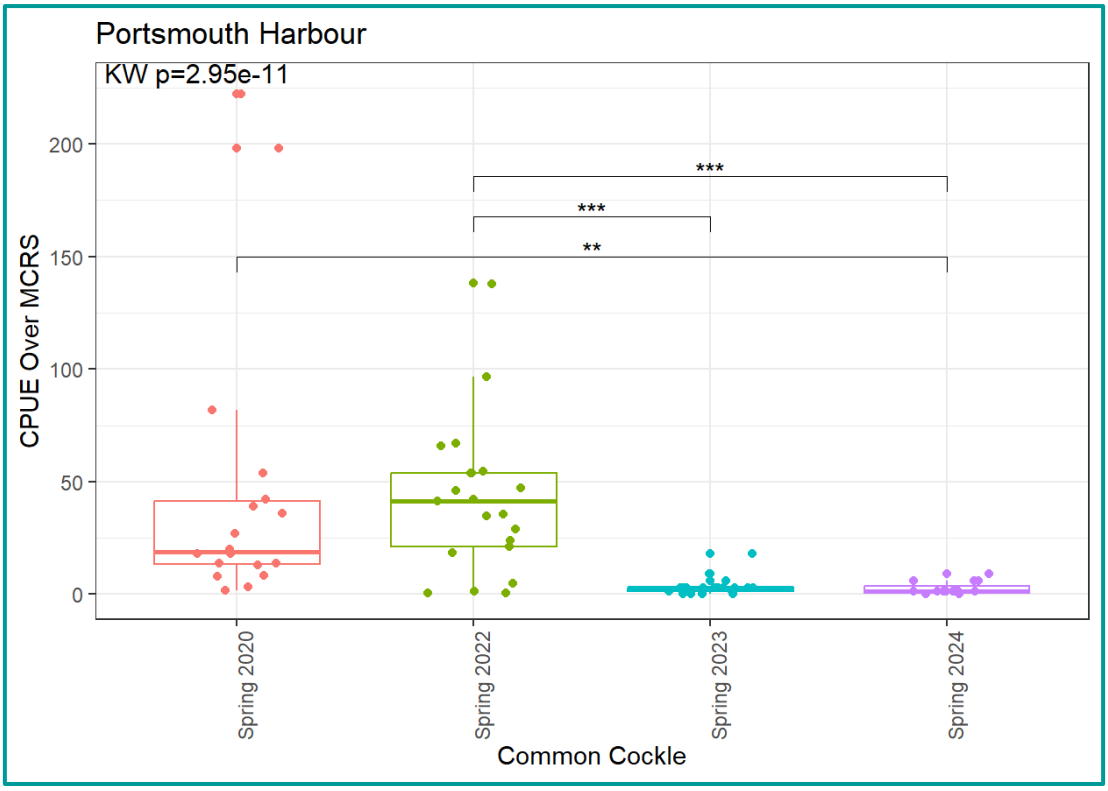

Figure 8: CPUE of the Common Cocke population equal to/above MCRS in Portsmouth Harbour for the spring surveys with available weight data from 2020 to 2024.

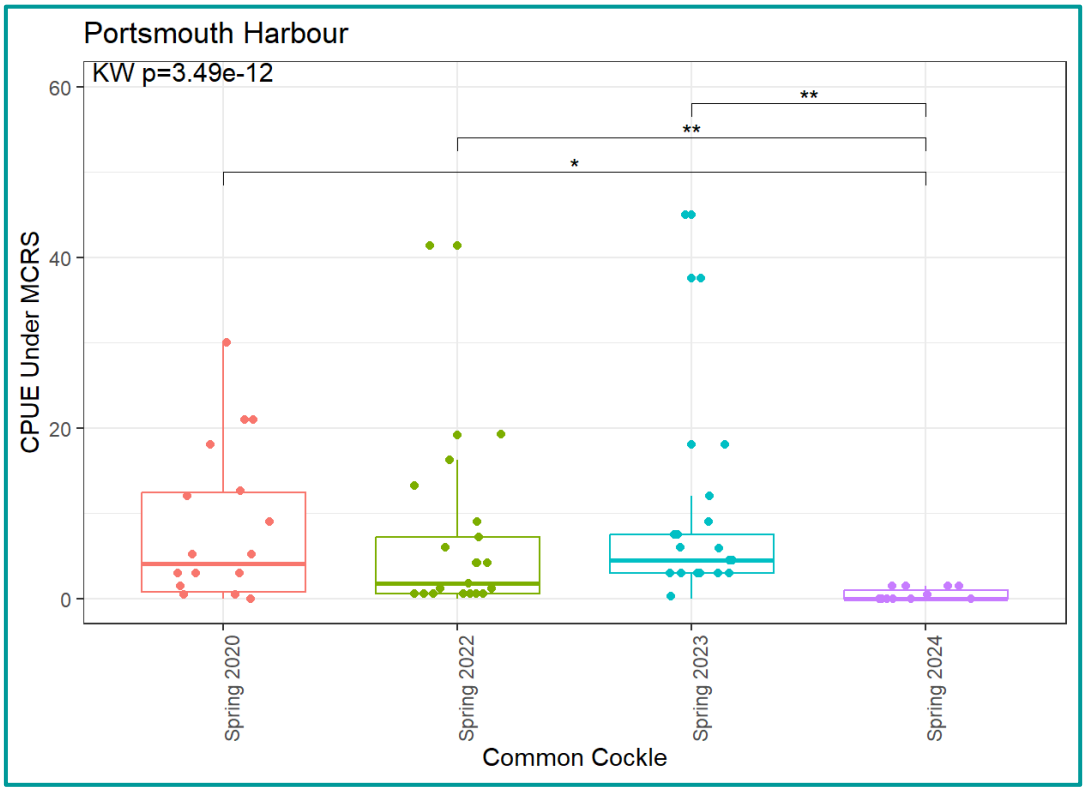

Figure 9: CPUE of the Common Cockle population below MCRS in Portsmouth Harbour for the spring surveys with available weight data from 2020 to 2024.

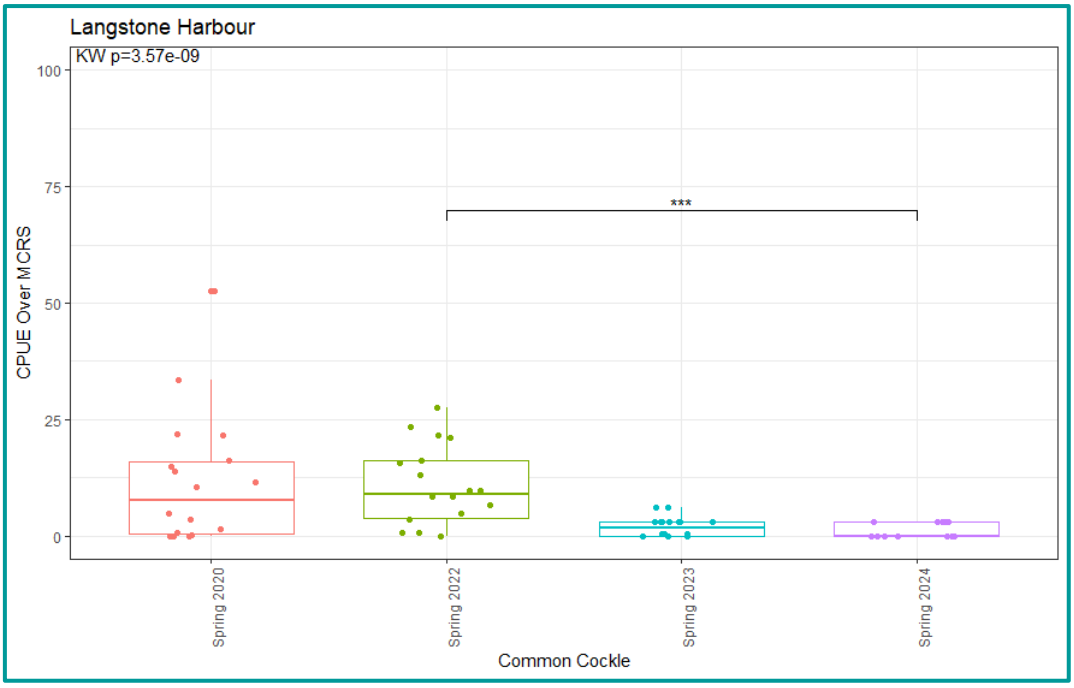

Figure 10: CPUE of the Common Cockle population equal to/above MCRS in Langstone Harbour for the spring surveys with available weight data from 2020 to 2024, where a statistically significant decrease was found between 2022 and 2024 ($p < 0.01$).

3.1.4. Autumn Survey (pre-season) Comparisons

CPUE for surveys carried out in the Autumn, representing pre-season conditions, has been compared between the survey years.

For Manila clam CPUE data is available from 2018 to 2019 and 2021 to 2024. For Common cockles CPUE data is available for 2021 to 2024, as weight data was not collected for Common cockle prior to 2020. Please note that there is no survey data available from Autumn 2020 due to the Covid-19 pandemic.

Manila Clam (Between Autumn Surveys)

- There was **no significant change** in CPUE for the population equal to/above or below MCRS between any Autumn surveys and the Autumn 2024 survey in **Southampton Water, Portsmouth or Langstone Harbours**.

Common Cockle (Between Autumn Surveys)

- In **Southampton Water**, there was **no significant change** in CPUE for the population equal to/above or below MCRS for any of the Autumn surveys in comparison to Autumn 2024.
- In **Portsmouth Harbour**, there was a **significant ($p < 0.01$) decrease** in average CPUE for the population equal to/above MCRS between the Autumn 2021 (22.80 kg m^{-1} hr^{-1}) and Autumn 2024 (1.57 kg m^{-1} h^{-1}) surveys (Figure 11).
- In **Langstone Harbour**, there was a **significant ($p < 0.01$) decrease** in average CPUE for the population equal to/above MCRS between the Autumn 2021 (4.50 kg m^{-1} hr^{-1}) and the Autumn 2024 (0.00 kg m^{-1} hr^{-1}) surveys (Figure 12).

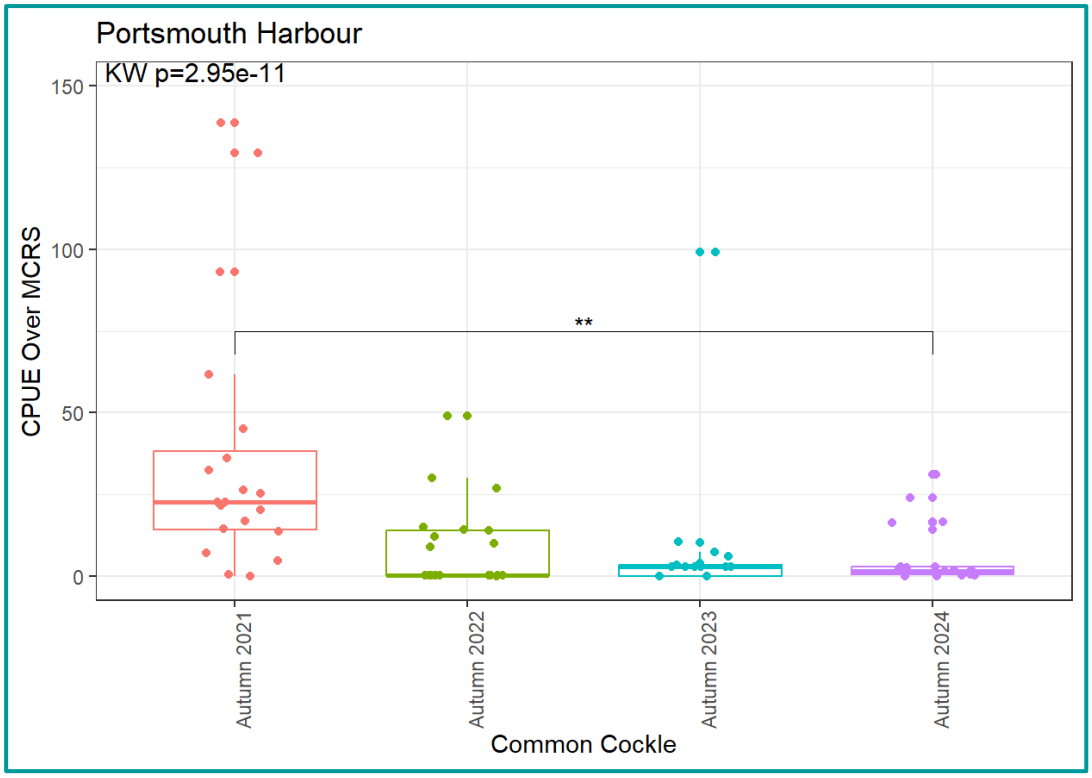

Figure 11: CPUE of the Common Cockle population equal to/above MCRS in Portsmouth Harbour for the autumn surveys with available weight data from 2020 to 2024, where a statistically significant decrease was found between 2021 and 2024 ($p < 0.01$).

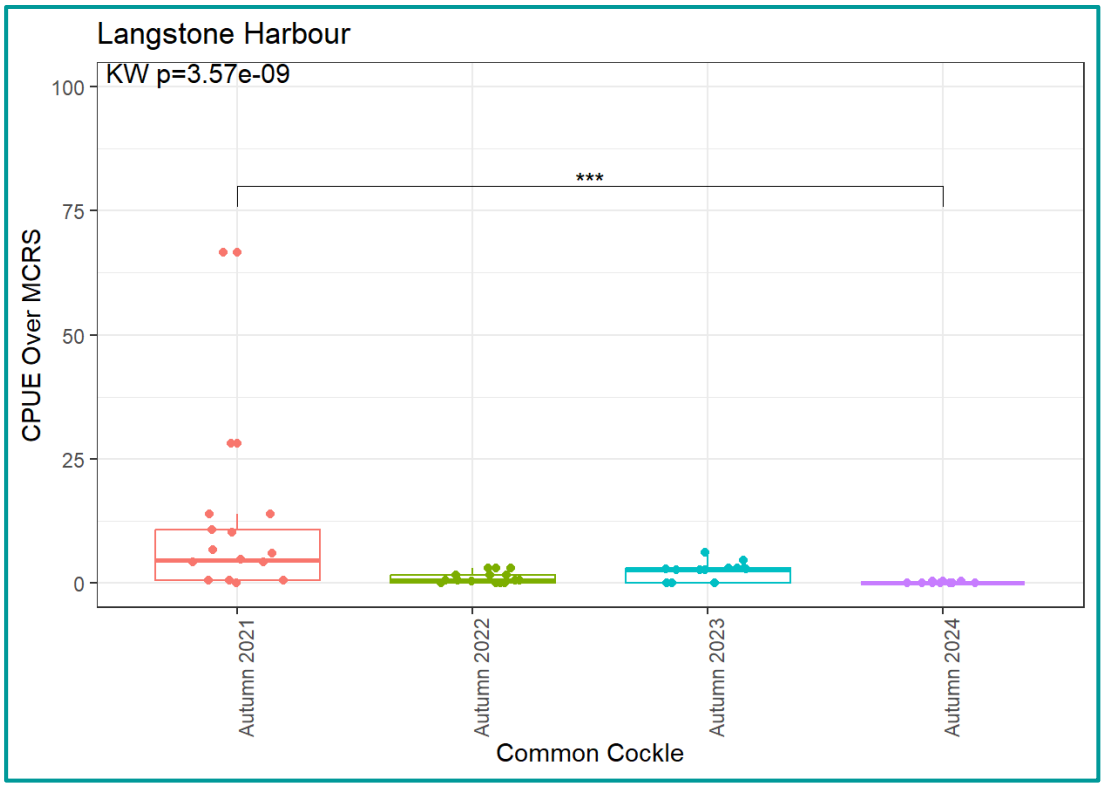

Figure 12: CPUE of the Common Cockle population below MCRS in Portsmouth Harbour for the autumn surveys with available weight data from 2020 to 2024, where a statistically significant decrease was found between 2021 and 2024 ($p < 0.01$).

3.2. Average Length

An analysis of the length trends within the data collected in 2024 and the data collected within the survey timeseries was undertaken. Given the lack of general trend observed within the results of this analysis, the following section presents the occurrence of average length equal to/above or below MCRS within each BMA. The full comparative results for analysis of length data between key time periods within the year are available within Annex 1.

The average length values presented are the median value (the middle value in a range of sequential values), as this is the metric compared within Kruskal-Wallis tests (used when data is non-normally distributed).

3.2.1. Pre- and Post- the 23/24 Fishing Season

Table 1: Average length of all Manila clam and Common cockle sampled the Autumn 2023 and Spring 2024 surveys as an indication of population structure in relation to the MCRS of each species. Red shading indicates an average length that falls below the species' MCRS, green shading that the average length is above the species' MCRS. An * indicates a significant change in average length between the two surveys.

	BMA		
Manila Clam (MCRS = 35mm)	**Southampton Water**	**Portsmouth Harbour**	**Langstone Harbour**
Autumn 2023	34mm	35mm	37mm
Spring 2024	33mm	37mm*	37mm
Common Cockle (MCRS = 23.8mm)			
Autumn 2023	26mm	29mm	26.5mm
Spring 2024	27mm	28mm	26mm

3.2.2. Pre- and Post- the 2024 Closed Season Comparisons

Table 2: Average length of all Manila clam and Common cockle sampled during the Spring 2024 and Autumn 2024 surveys as an indication of population structure in relation to the MCRS of each species. Red shading indicates an average length that falls below the species' MCRS, green shading that the average length is above the species' MCRS.

	BMA		
Manila Clam (MCRS = 35mm)	**Southampton Water**	**Portsmouth Harbour**	**Langstone Harbour**
Spring 2024	33mm	37mm	37mm
Autumn 2024	34mm	35mm	37mm
Common Cockle (MCRS = 23.8mm)			
Spring 2024	27mm	28mm	26mm
Autumn 2024	27mm	27mm	27mm

3.2.3. Spring Survey (post-season) Comparisons

Table 3: Average length of all Manila clam and Common cockle sampled during the Spring 2023 and 2024 surveys as an indication of population structure in relation to the MCRS of each species. Red shading indicates an average length that falls below the species' MCRS, green shading that the average length is above the species' MCRS. An * indicates a significant change in average length between the two surveys.

	BMA		
Manila Clam (MCRS = 35mm)	**Southampton Water**	**Portsmouth Harbour**	**Langstone Harbour**
Spring 2023	34mm	36mm	37mm
Spring 2024	33mm*	37mm*	37mm*
Common Cockle (MCRS = 23.8mm)			
Spring 2023	27mm	27mm	26mm
Spring 2024	27mm	28mm	26mm

3.2.4. Autumn Survey (pre-season) Comparisons

Table 4: Average length of all Manila clam and Common cockle sampled during the Autumn 2023 and 2024 surveys as an indication of population structure in relation to the MCRS of each species. Red shading indicates an average length that falls below the species' MCRS, green shading that the average length is above the species' MCRS. An * indicates a significant change in average length between the two surveys.

	BMA		
Manila Clam (MCRS = 35mm)	**Southampton Water**	**Portsmouth Harbour**	**Langstone Harbour**
Autumn 2023	34mm	35mm	37mm
Autumn 2024	34mm	35mm*	37mm
Common Cockle (MCRS = 23.8mm)			
Autumn 2023	26mm	29mm	26.5mm
Autumn 2024	27mm*	27mm*	27mm

4. Catch Data

The total kg of Manila clam caught across all vessels during the 23/24 season was 59.6 tonne, an increase from the 22/23 season at 41.1 tonne and from the 21/22 season at 57.9 tonne (Figure 13). There was no common cockle recorded as being landed by the fishery for the 23/24 season.

To date there are three years of catch data available for the Solent Bivalve fishery, with data first collected in November 2021 when the Solent Dredge Permit Byelaw came into effect. As such there is not yet sufficient years of catch data to establish patterns or to relate catch data to patterns seen in the CPUE results. The lack of significant negative results between Autumn 2023 and Spring 2024 survey results suggest that catch levels are not having a negative influence on the stock and that there are other factors which may be influencing changes in the stock levels between years.

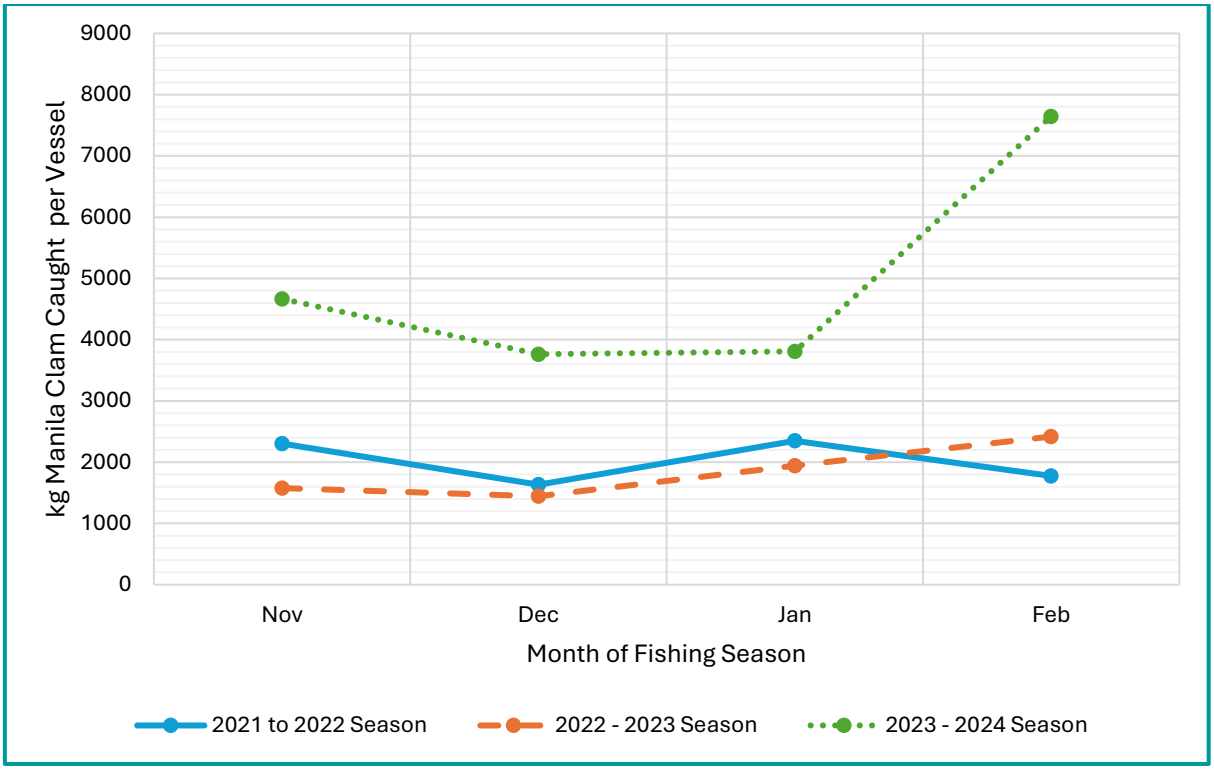

Figure 13: Kg of Manila Clam recorded by fishers within the Solent Bivalve fishery over the three seasons for which Southern IFCA hold data.

5. Discussion

5.1. CPUE

Between the Autumn 2023 and Spring 2024 surveys, the only significant result was a statistically significant increase in CPUE for Manila clams equal to/above the Minimum Conservation Reference Size (MCRS) in Southampton Water (Figure 5). For all other comparisons no significant difference was found, suggesting that the current fishing pressure is not having a significant effect on the populations of the three sampled BMAs for this species. Catches of Manila clam within the Solent Bivalve fishery increased during the 2023/24 fishing season in comparison to the previous two seasons (Figure 13), however a lack of consistent trends across all populations sampled and only limited catch data to date (3 years) prevent clear conclusions from being drawn in terms of catch data relating to stock data and does not preclude that results could instead be a factor of population changes during the year and the influence of environmental variables.

No statistically significant change in average CPUE was found for either Manila clam or common cockle between the Spring 2024 and Autumn 2024 surveys. This continues a trend observed in previous years of no significant change being seen during the Bivalve fishery closed season.

Significant positive changes in average CPUE were seen for both portions of the Manila clam population in Southampton water between Spring 2023 and Spring 2024 (Figures 6 & 7). For common cockle, a significant decrease is noted for equal to/above MCRS in Spring 2024 compared to two previous years and for below MCRS compared to three previous years in Portsmouth Harbour, as well as for equal to/above MCRS compared to 2022 for Langstone Harbour. In addition, significant decreases were seen between Autumn surveys for this species in Portsmouth Harbour and Langstone Harbour in 2024 compared to 2021. The decrease in common cockle CPUE has occurred in the last 1-2 years, however there is inconsistency in a defined trend, with increases observed

(although not significant) between 2022 and 2023 in certain portions of the stock in different BMAs. The observed decrease in common cockle stock occurs alongside no harvesting of common cockle in the 23/24 season and no recorded landings of this species in any year since the permit fishery was established. It is therefore more likely that the stock variation is due to natural factors or environmental influence. It is noted in other populations of common cockle, such as in Poole Harbour, that cockle stocks can be cyclical over periods of 3-4 years. The trends will continue to be monitored through analysis of survey data, and the lack of targeting of this species does not suggest further action beyond monitoring is required at this stage.

No statistically significant change in average CPUE was found for either portion of the Manila clam populations of the BMAs among the Autumn survey timeseries. This suggests that the condition of the populations within the Solent Bivalve fishery at the end of the closed season have remained statistically stable through the timeseries.

5.2. Average Length

Between Autumn 2023 and Spring 2024 (the fishery open season) only Manila clam within Portsmouth Harbour saw a statistically significant change in average length, an increase. This population was also the only one to see a statistically significant change during the fishery closed season (Spring 2024 to Autumn 2024), a decrease. Given these trends are the opposite to those that would be expected to be seen (a decrease in length during the fishing season, and an increase in length during the closed season), it suggests there are a number of influencing factors outside fishing activity that are acting on the species size distribution.

The significant results found between the Spring surveys of each year and between the Autumn surveys of each year (Table 3 & 4) are mixed and as such difficult to attribute to specific factors.

6. Summary

- The Manila clam population equal to/above the MCRS in Southampton Water was the only group sampled to display a significant trend in average CPUE during the 2023/24 fishing season, an increase.
- In addition, no significant trends were seen for either species in any BMA during the 2024 fishery closed season.
- In comparisons between years for the same survey period, Manila clam displayed either an increase (CPUE equal to/above MCRS Spring 23 to 24) or no significant difference.
- The results from this CPUE analysis suggest that fishing pressure is not having a significant impact on this fishery, and that trends could be related to the influence of environmental variables.
- For common cockle, there is a trend in decreasing stock levels between years for spring and autumn surveys, however, there has been no recorded landings for this species under the Solent Dredge Permit Byelaw, suggesting that fishing is not the influencing factor on the stock trend. Trends are therefore likely to be natural variation or environmentally driven. Continued monitoring through stock surveys is recommended.
- The average length of Manila clam sampled in the Spring 2024 and Autumn 2024 surveys was above the MCRS of 35mm in Langstone Harbour and Portsmouth Harbour, but below the MCRS in Southampton Water.
- The average length of Common cockle sampled in the Spring 2024 and Autumn 2023 surveys remained above the MCRS of 23.8mm for all three BMAs.
- The total kg of Manila clam caught during the season and the kg of Manila clam caught per vessel were higher for the 2023/24 season than for the previous two seasons. There were no recorded landings for common cockle.

Annex 1

Average Length Analysis

The average length of Manila clam and Common cockle within the three BMAs was compared for four key time periods: pre- and post- the 23/24 Fishing Season; pre- and post- the 2024 Closed Season; Spring 2024 with previous spring surveys; and Autumn 2024 with previous autumn surveys. The significant results found for these comparisons of average length are listed in Tables 5 and 6. Histograms for each species in each of the BMAs are provided below.

Table 5: The significant results of comparisons of average length over four time periods for Manila clam within the three BMAs sampled in the Solent Bivalve survey.

Manila Clam	Southampton Water	Portsmouth Harbour	Langstone Harbour
Pre- and Post- 23/24 Fishing Season		Increase	
Pre- and Post- 2024 Closed Season		Decrease	
Spring Surveys	Decrease 2024 in comparison to 2022	Increase 2024 in comparison to 2022	Decrease 2024 in comparison to 2022
	Decrease 2024 in comparison to 2023		
Autumn Surveys		Increase 2024 in comparison to 2022	

Table 6: The significant results of comparisons of average length over four time periods for Common cockle within the three BMAs sampled in the Solent Bivalve survey.

Common Cockle	Southampton Water	Portsmouth Harbour	Langstone Harbour
Pre- and Post- 23/24 Fishing Season			
Pre- and Post- 2024 Closed Season			
Spring Surveys			
Autumn Surveys	Increase 2024 in comparison to 2023	Increase 2024 in comparison to 2022	
		Decrease 2024 in comparison to 2023	

Spring surveys (Post-season) Comparisons

Manila Clam

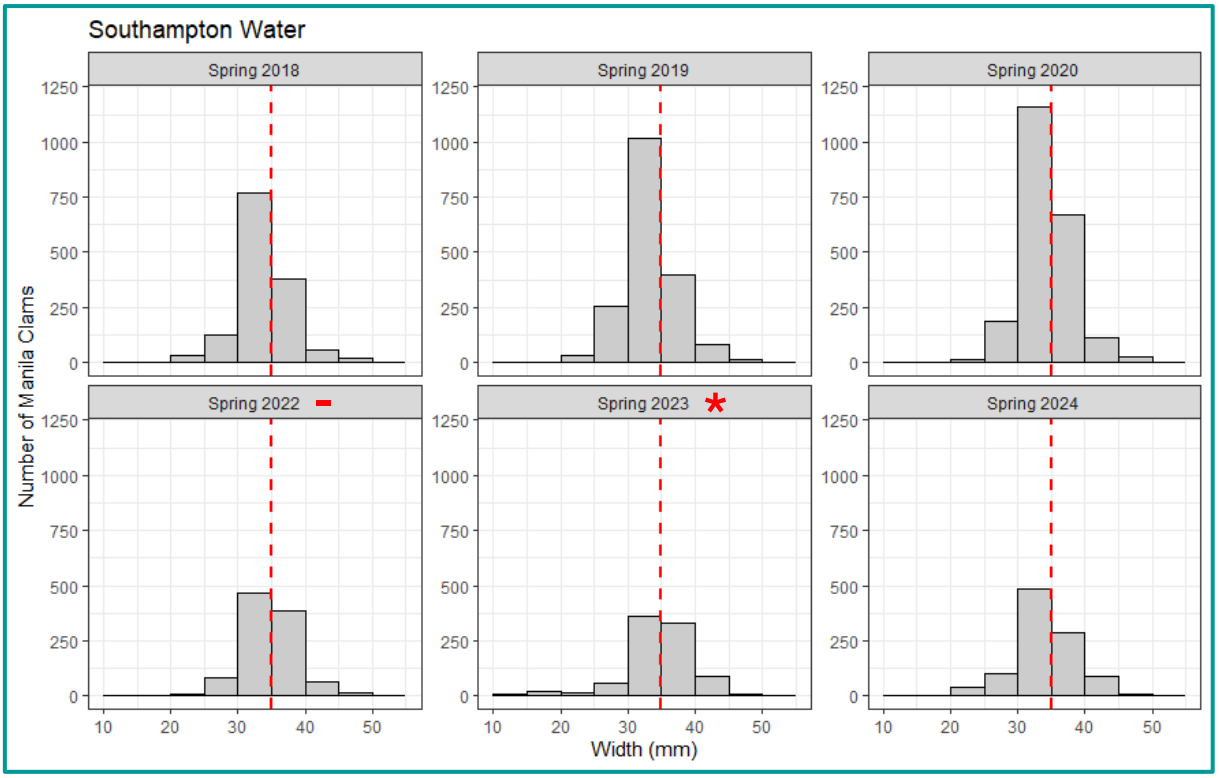

Figure 14: Length histograms for Manila Clam sampled in Southampton Water during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm). Red symbols (*, -) indicate a significant decrease in average length from the survey to 2024.

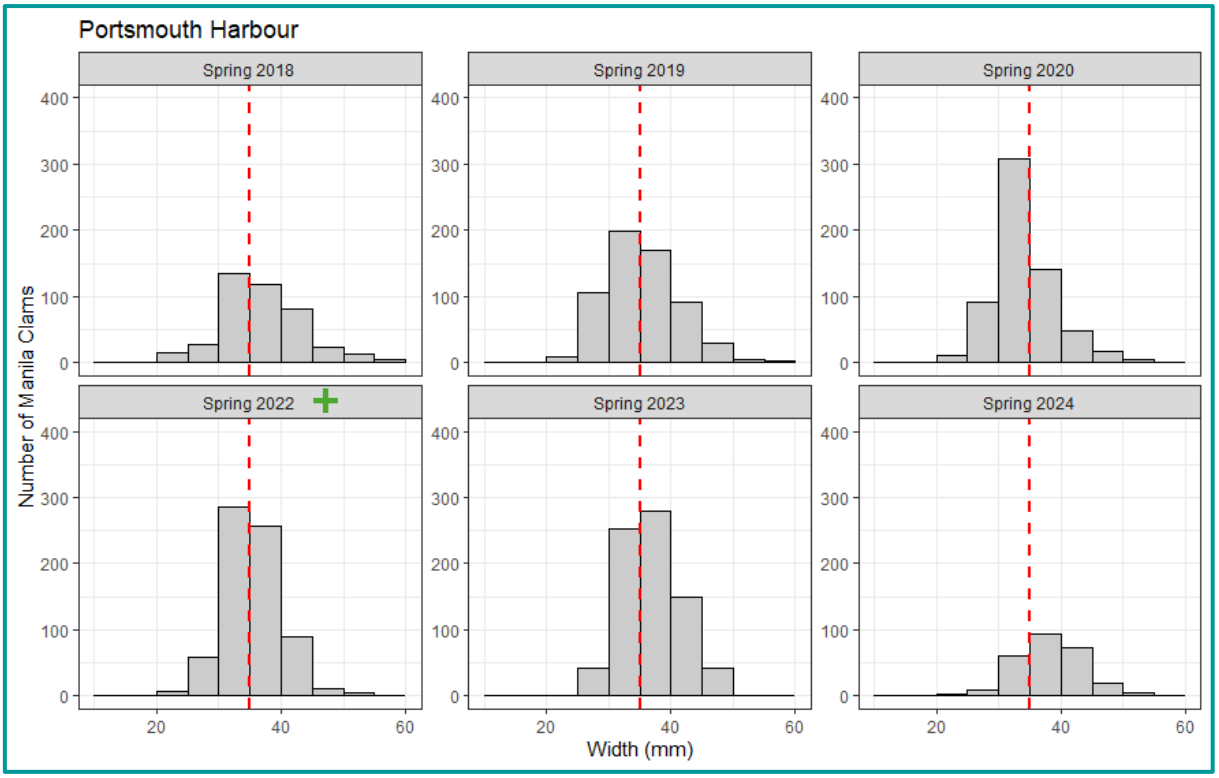

Figure 15: Length histograms for Manila clam sampled in Portsmouth Harbour during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm). Green symbol (+) indicated a significant increase in average length from that survey to 2024.

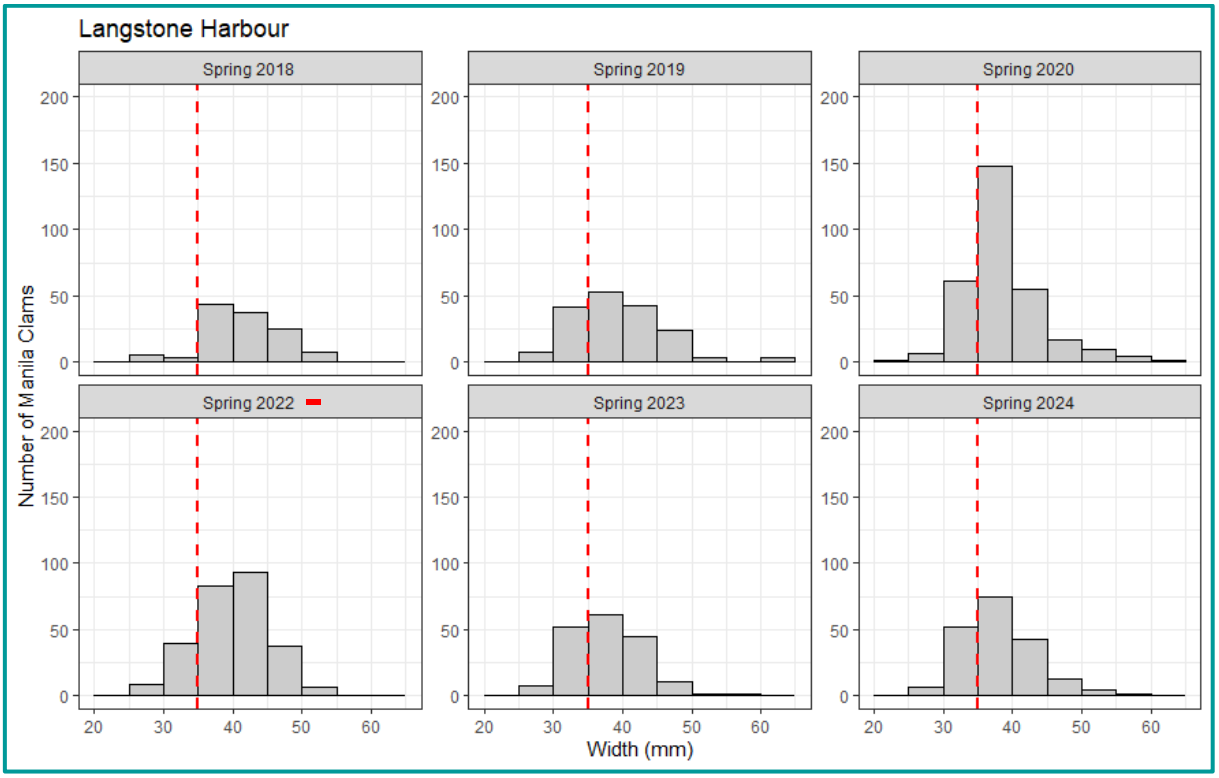

Figure 16: Length histograms for Manila clam sampled in Langstone Harbour during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm). Red symbol (-) indicates a significant decrease in average length from that survey to 2024.

Common Cockle

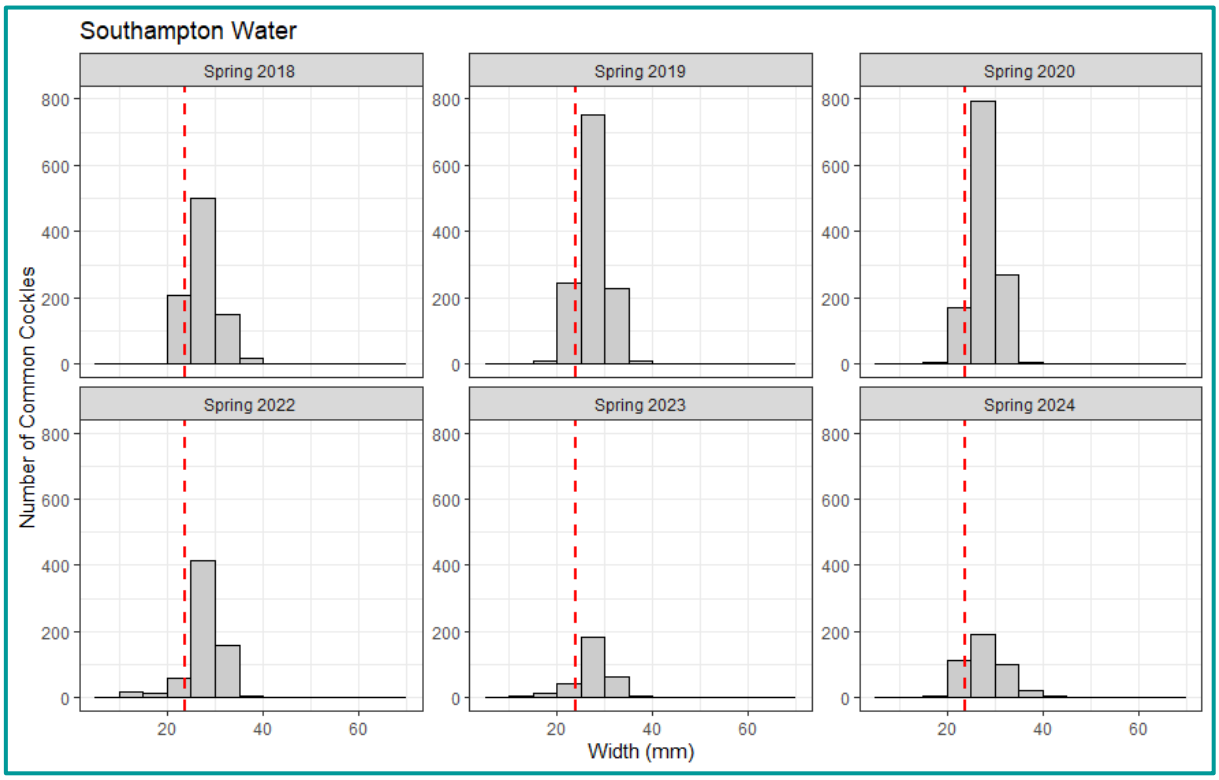

Figure 17: Length histograms for Common cockle sampled in Southampton Water during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm).

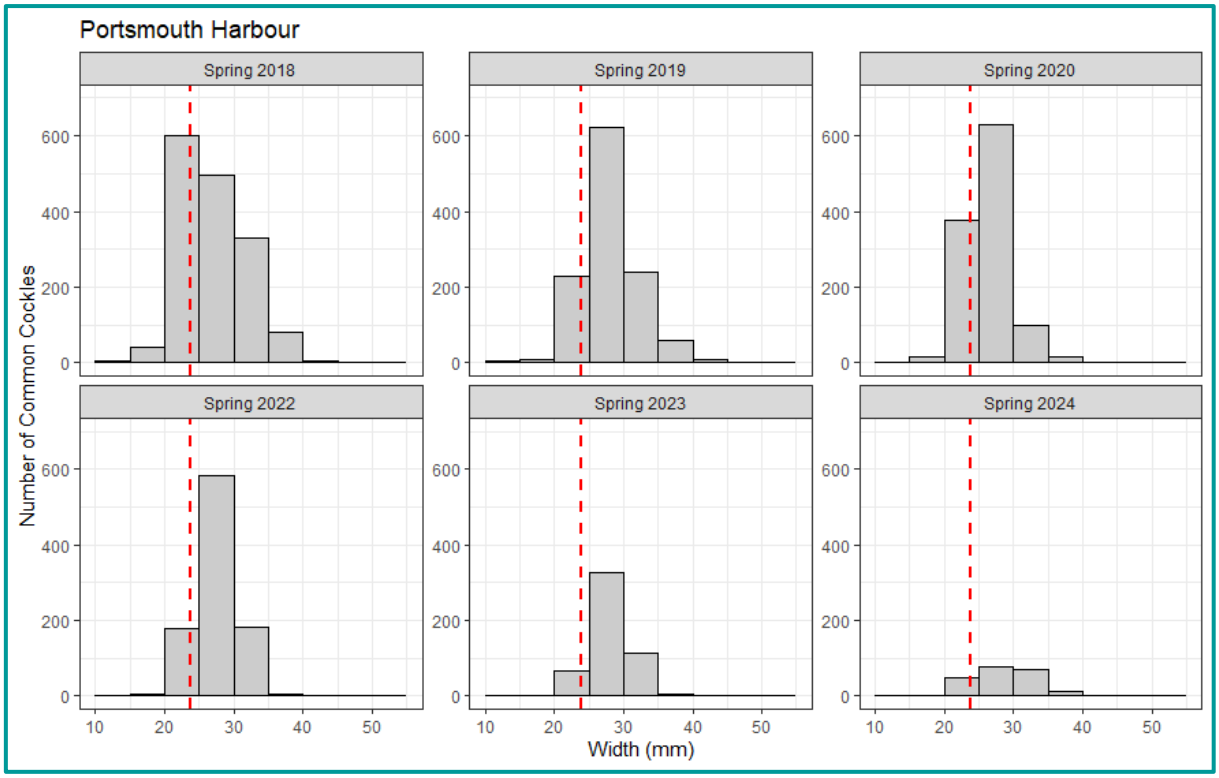

Figure 18: Length histograms for Common cockle sampled in Portsmouth Harbour during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm).

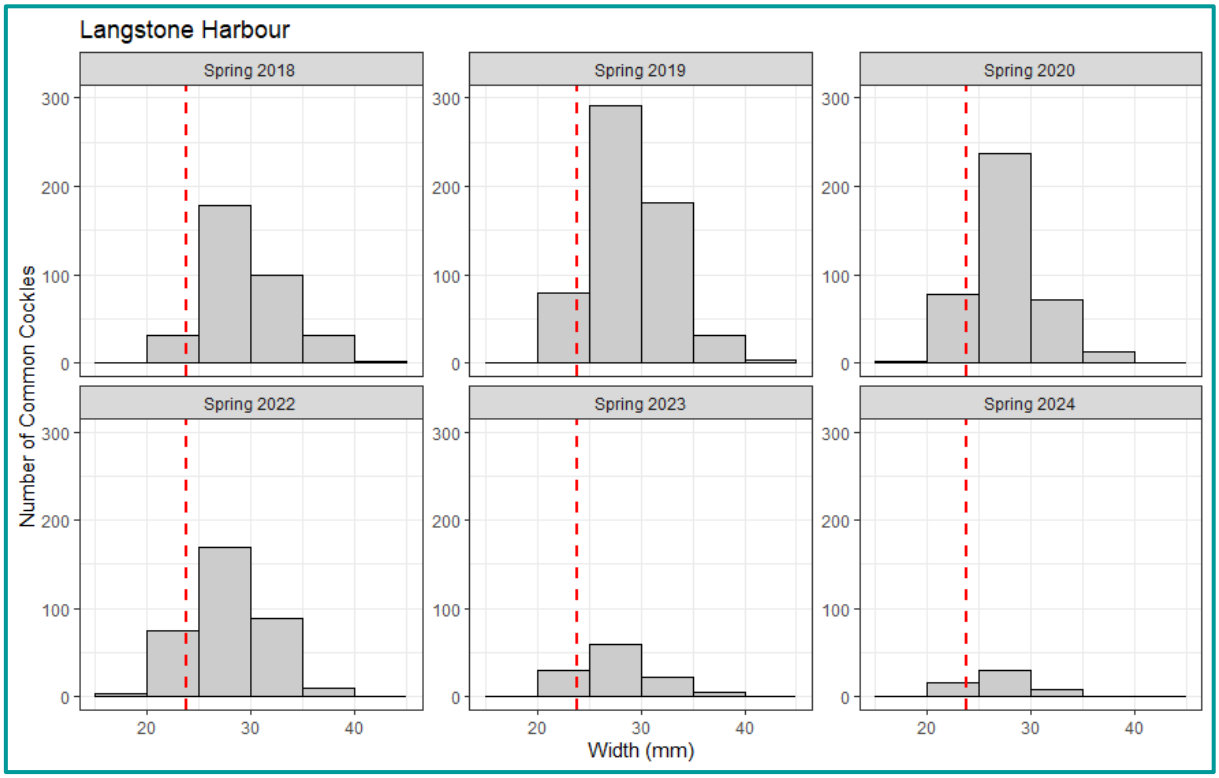

Figure 19: Length histograms for Common Cockle sampled in Langstone Harbour during the spring surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm).

Autumn Survey (pre-season) Comparisons

Manila Clam

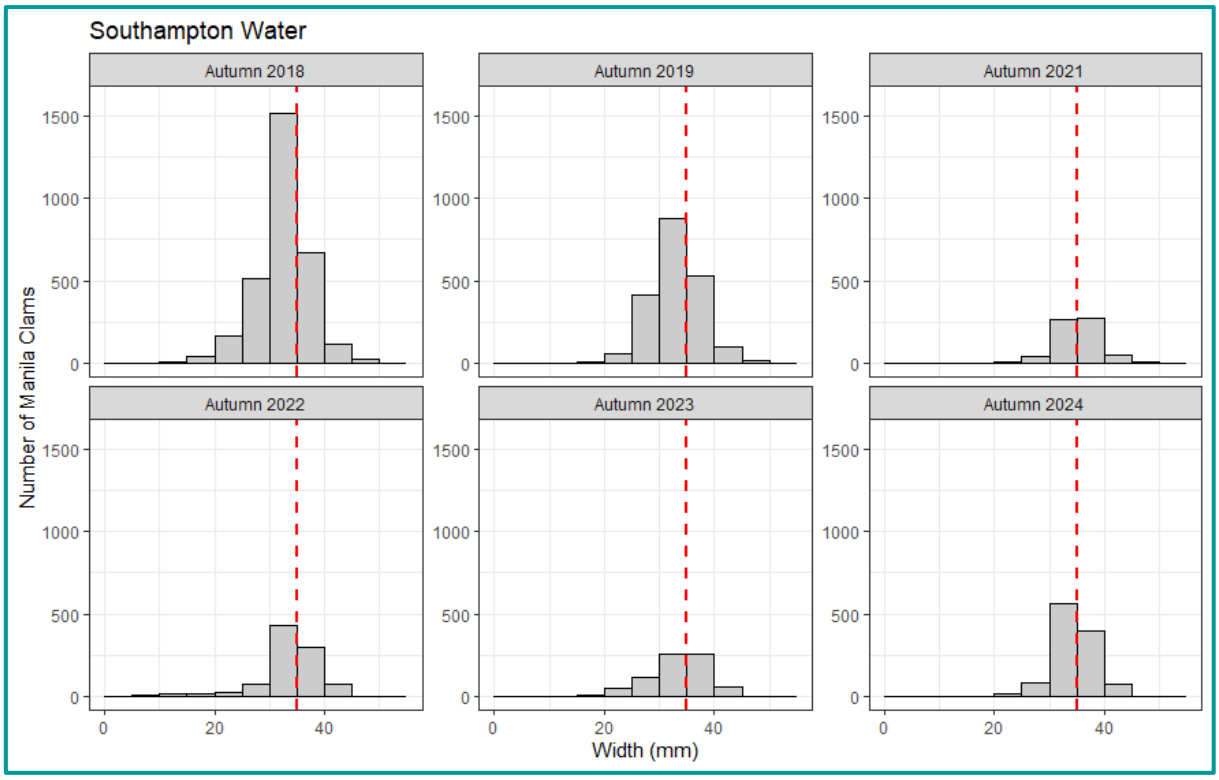

Figure 20: Length histograms for Manila Clam sampled in Portsmouth Harbour during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm).

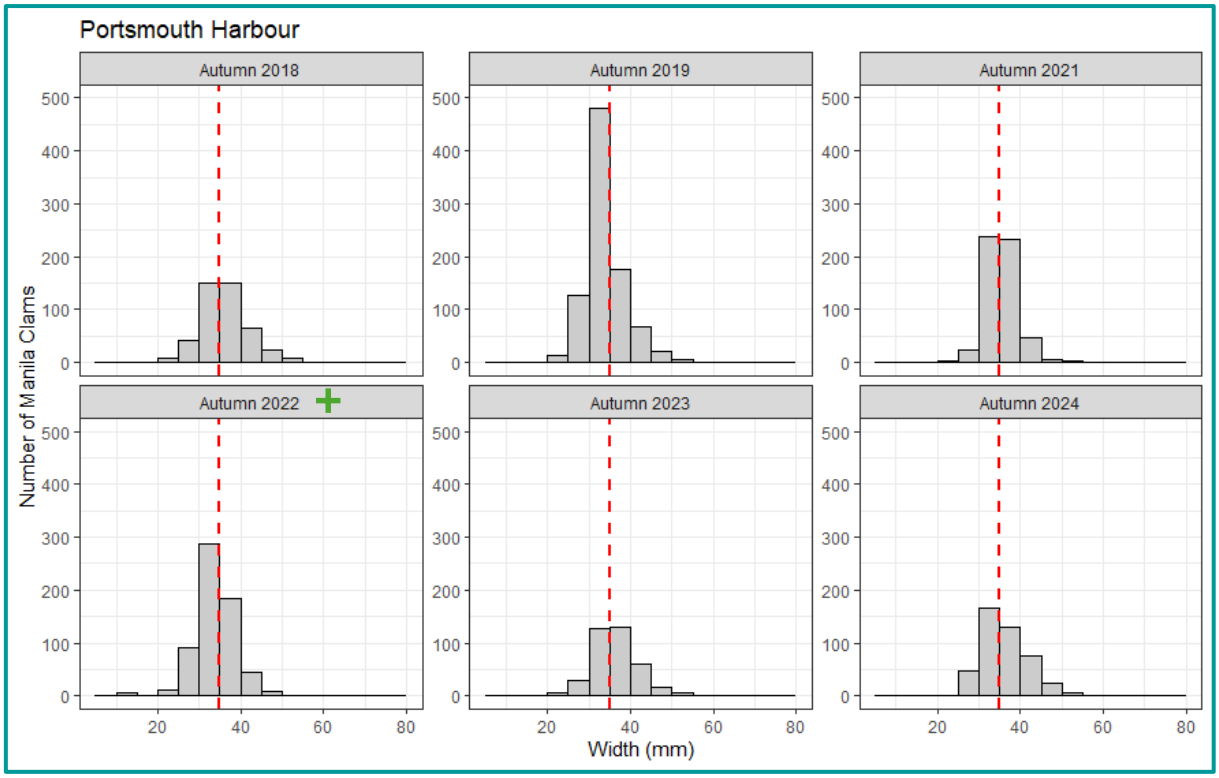

Figure 21: Length histograms for Manila clam sampled in Portsmouth Harbour during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm). Green symbol (+) indicates a significant increase in average length from that survey to 2024.

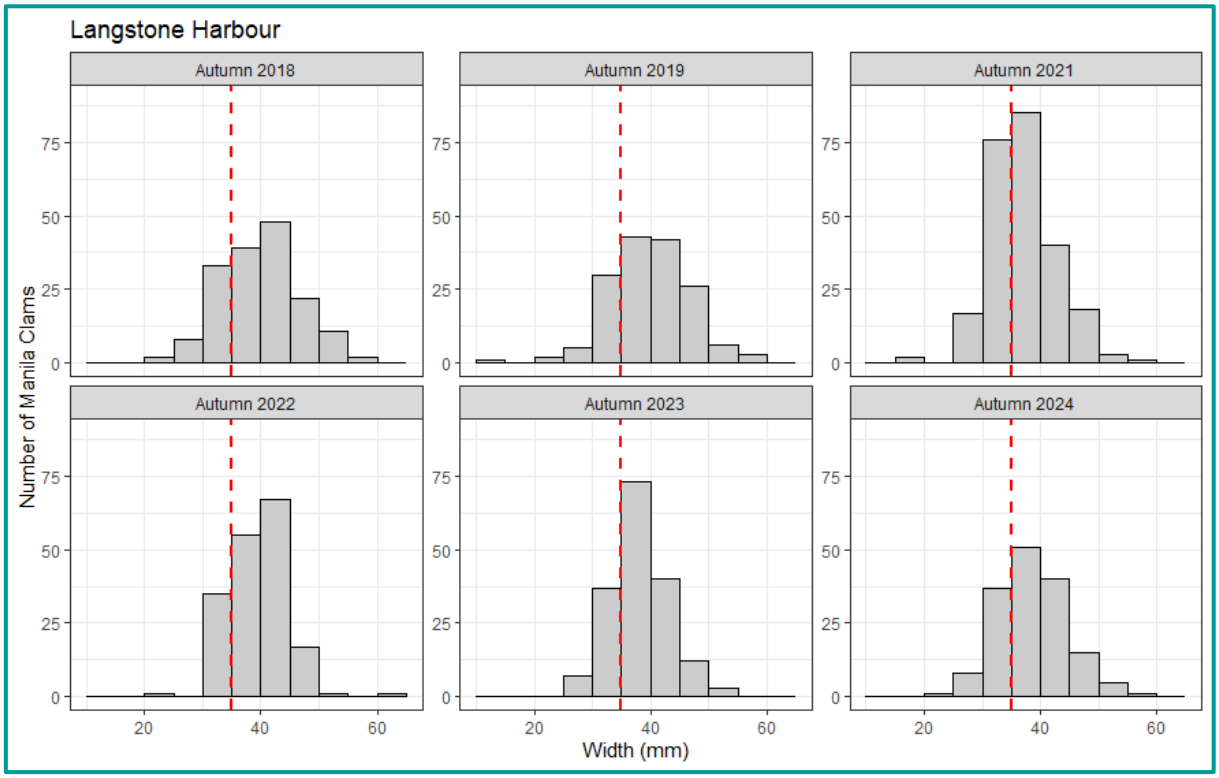

Figure 22: Length histograms for Manila clam sampled in Langstone Harbour during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (35mm).

Common Cockle

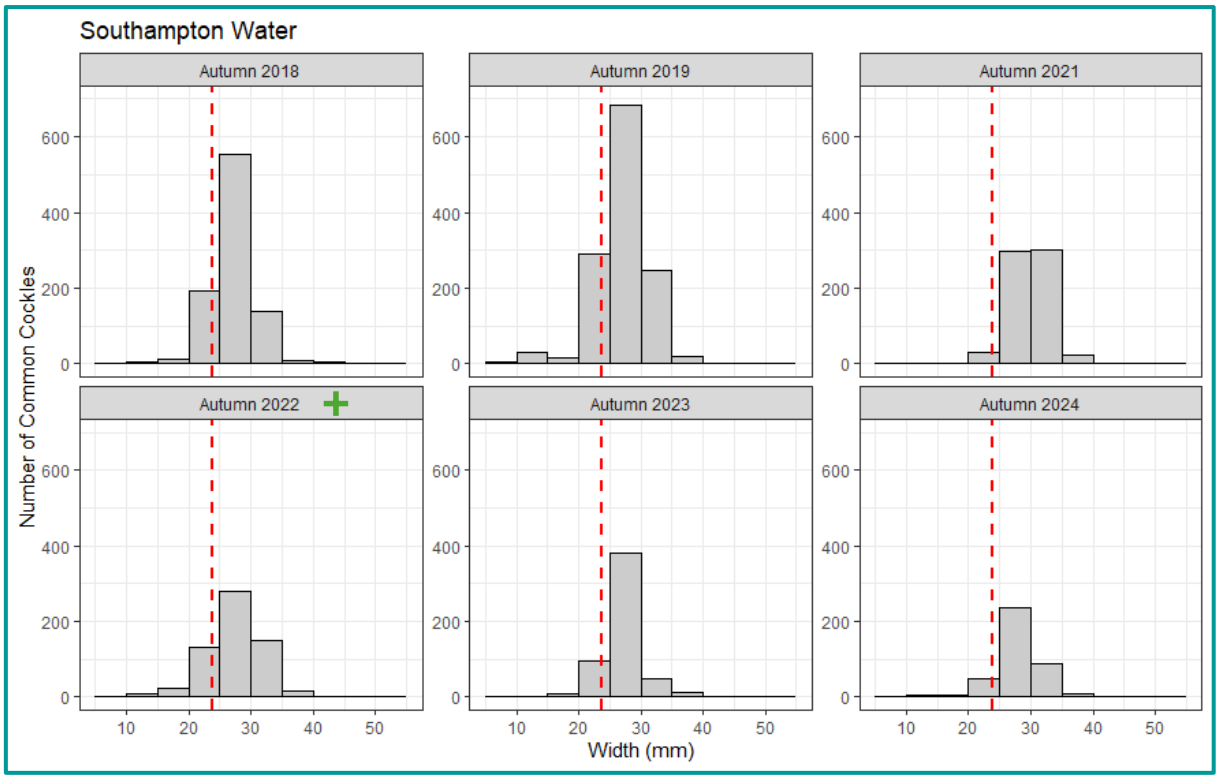

Figure 23: Length histograms for Common cockle sampled in Southampton Water during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm). Green symbol (+) indicates a significant increase in average length from that survey to 2024.

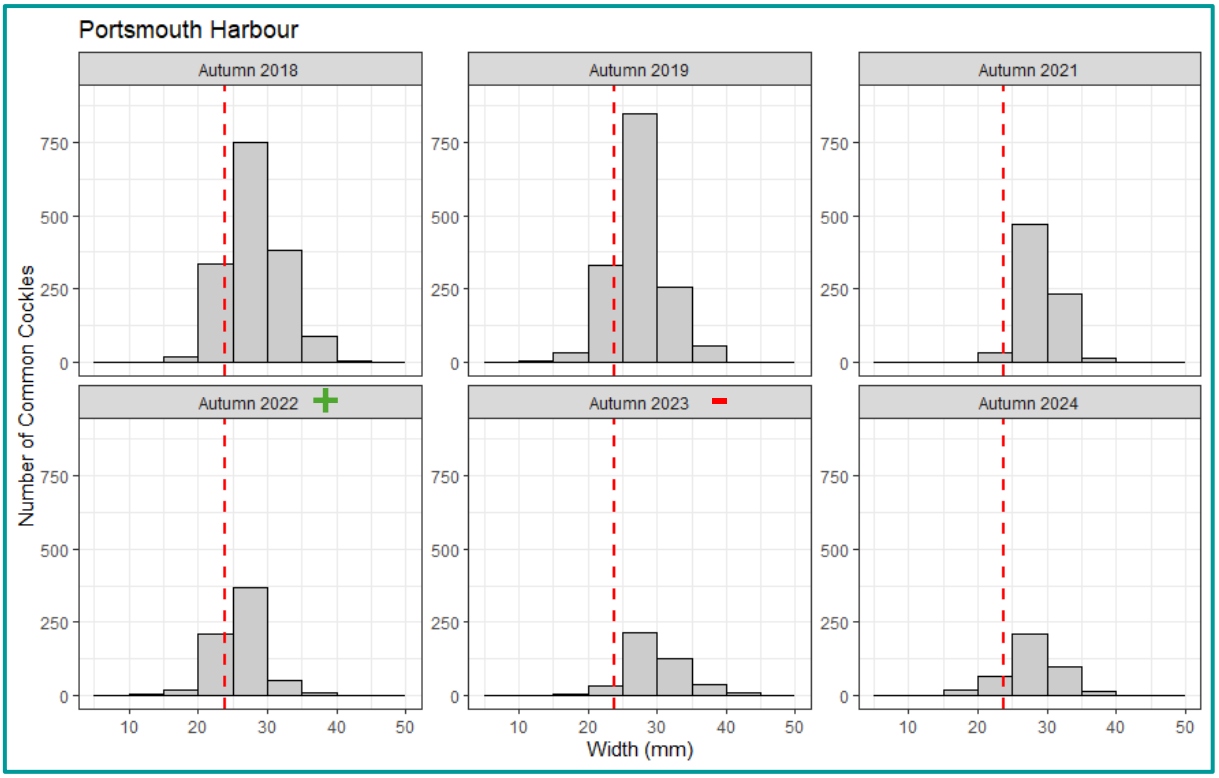

Figure 24: Length histograms for Common cockle sampled in Portsmouth Harbour during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm). Symbols (-, +) indicate significant changes in average length from the survey to 2024.

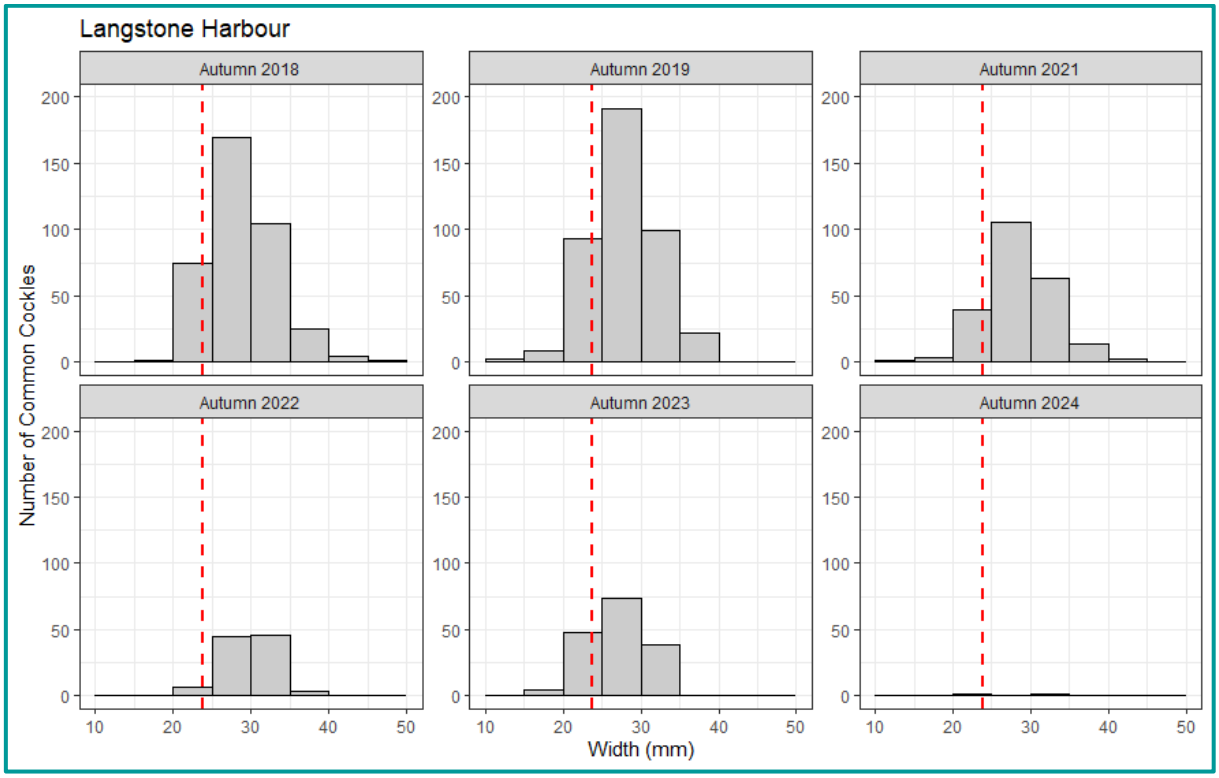

Figure 25: Length histograms for Common cockle sampled in Langstone Harbour during the autumn surveys within the Solent Bivalve survey timeseries (2018 to 2024). The red dashed line displays the Minimum Conservation Reference Size (23.8mm).