

# **Taw Torridge Cockle Stock Assessment 2022**



**Lauren Henly  
Environment Officer  
Devon and Severn Inshore Fisheries and Conservation Authority  
Research Report  
March 2023**

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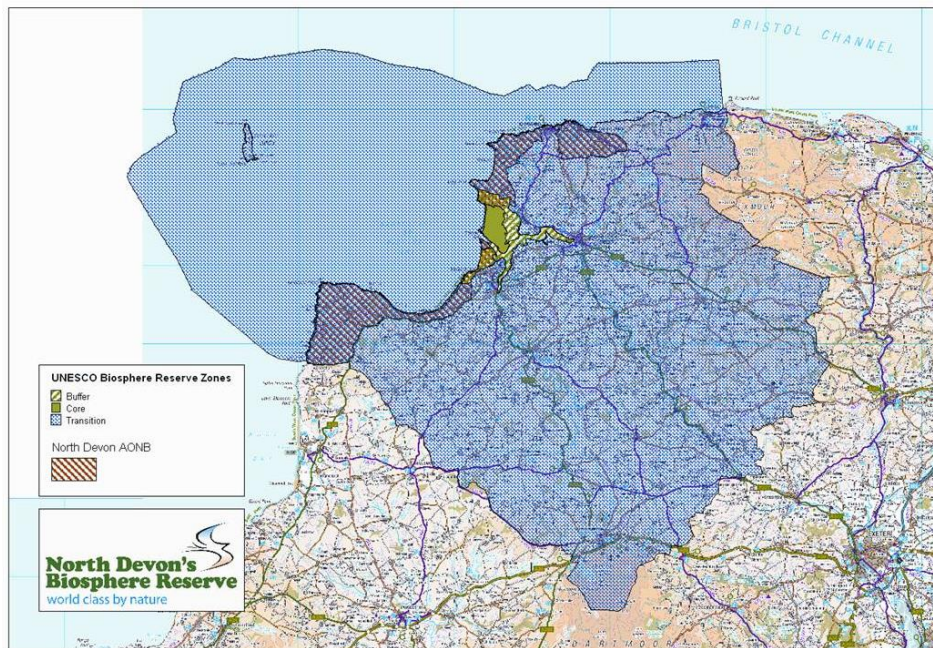
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<b>Version control history</b>			
<b>Author</b>	<b>Date</b>	<b>Comment</b>	<b>Version</b>
LH	15/03/2023	Draft report	0.1
	15/03/2023	Comments and amendments to draft by J. Stewart	0.2
LH	16/03/2023	Amendments following v0.2	0.3
LH	17/03/2023	Finalised by J. Stewart	1.0

## 1. Introduction

### 1.1 The Taw-Torridge Estuary

The Taw-Torridge estuary is located on the North Devon coast, within the Area of Outstanding Natural Beauty (AONB) and the North Devon UNESCO Biosphere Reserve (Figure 1).



**Figure 1 The location of the Taw Torridge Estuary (shown in yellow) within the North Devon Biosphere Reserve and the North Devon Coast AONB. (North Devon AONB and Biosphere Reserve Service, 2010)**

The Taw Torridge Estuary is an important site for wildlife and has been designated a Site of Special Scientific Interest (SSSI) (Figure 2) for over-wintering and migratory populations of wading birds, and for the rare plants found on its shores. Upper reaches of the estuary were considered for designation as a Marine Conservation Zone (MCZ) by the Finding Sanctuary Regional Stakeholder Group (RSG) (Figure 3) for six Broad Scale Habitats; subtidal mud, subtidal sand, coastal saltmarshes and saline reed beds, intertidal coarse sediment, intertidal sand and muddy sand, low energy intertidal rock, and one Feature of Conservation Interest (FOCI) species the European eel (*Anguilla anguilla*). However, to date the site has not been designated as an MCZ. Parts of Taw-Torridge Estuary also lie within the Braunton Burrows Special Area of Conservation, also shown in Figure 3.

Cockles, *Cerastoderma edule*, are present within the estuary and are known to be collected at low levels both historically and to the present day (Edwards, 1987; Cefas, 2013, 2020). Unlike mussels, the cockle stock has never reached a large enough level to be harvested commercially from within the estuary.

Devon and Severn Inshore Fisheries and Conservation Authority (D&S IFCA) understands the social and ecological importance of these beds and have undertaken survey work to establish the population structure, biomass, and distribution of cockles within the areas of the estuary where cockles are known to be present. The biomass of cockles estimated as a result of these surveys can be fed into a shellfish ecological requirement model provided by Natural England, which allows an estimate to be made of the ecological requirements of wading birds (specifically oystercatchers, *Haematopus ostralegus*) feeding on shellfish in the areas surveyed by D&S IFCA. This report will assist with monitoring the cockle stock in the Taw Torridge Estuary.

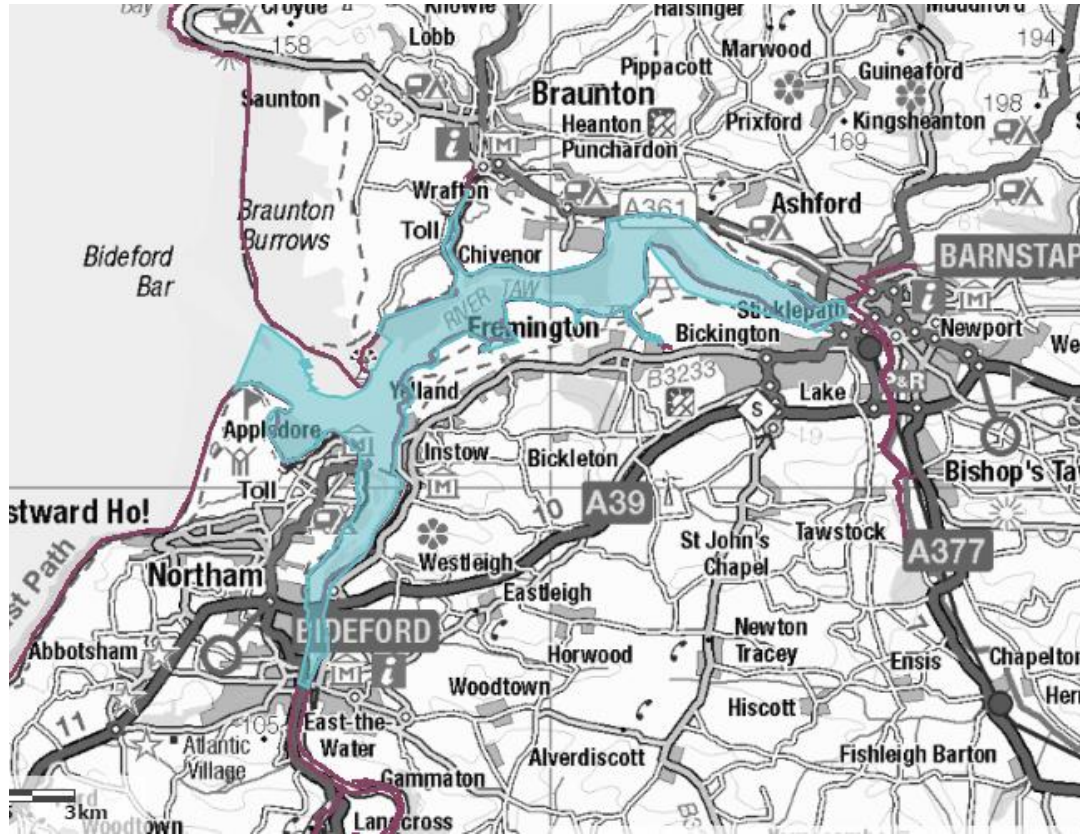


Figure 2 Taw-Torridge Estuary SSSI, shown in blue (Defra, 2020)

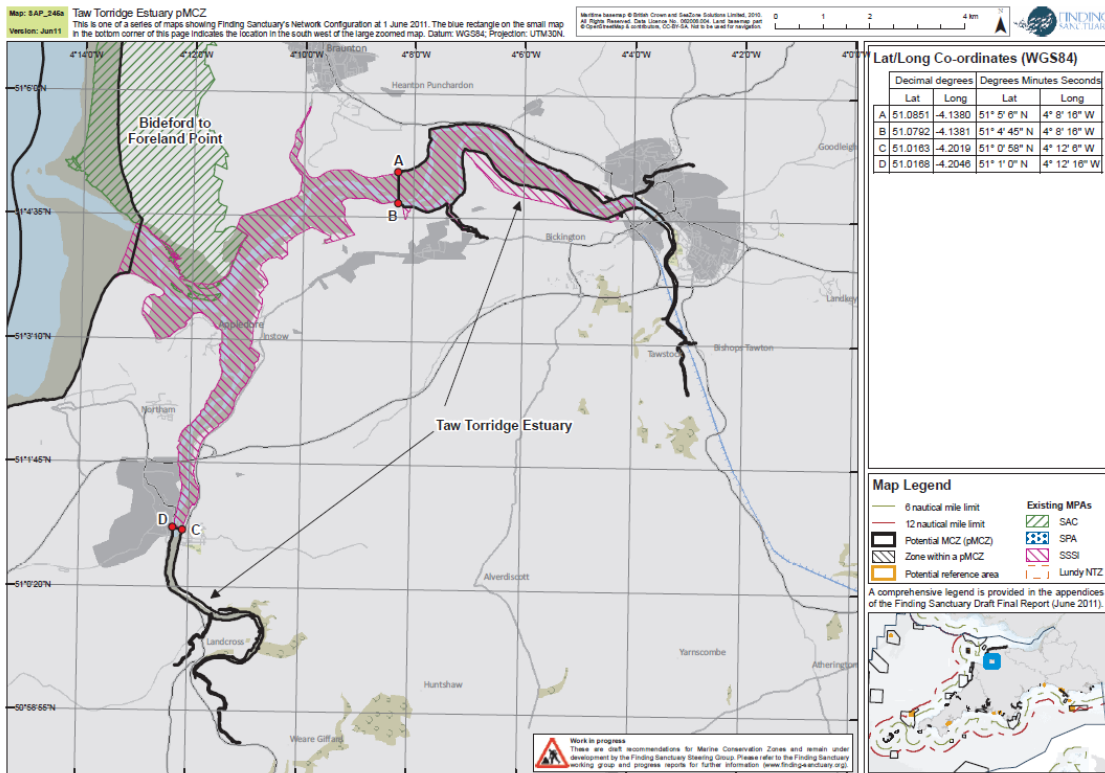


Figure 3 Area of rMCZ, outlined in black. Area of SSSI shown in red hatching, and area of SAC shown by green hatching. (Lieberknecht et al., 2011)

## 2. Methods

Cockle surveys were conducted for the first time at Instow and Old Walls (Figure 4) on 7<sup>th</sup> and 8<sup>th</sup> November 2022, respectively. The surveys were conducted at low water spring tides. Survey locations were identified from anecdotal information about areas that were historically known to contain cockles and where harvesting has been observed. A grid of survey stations (distanced approximately 93 m x 93 m apart) was laid over these areas (Figure 4).

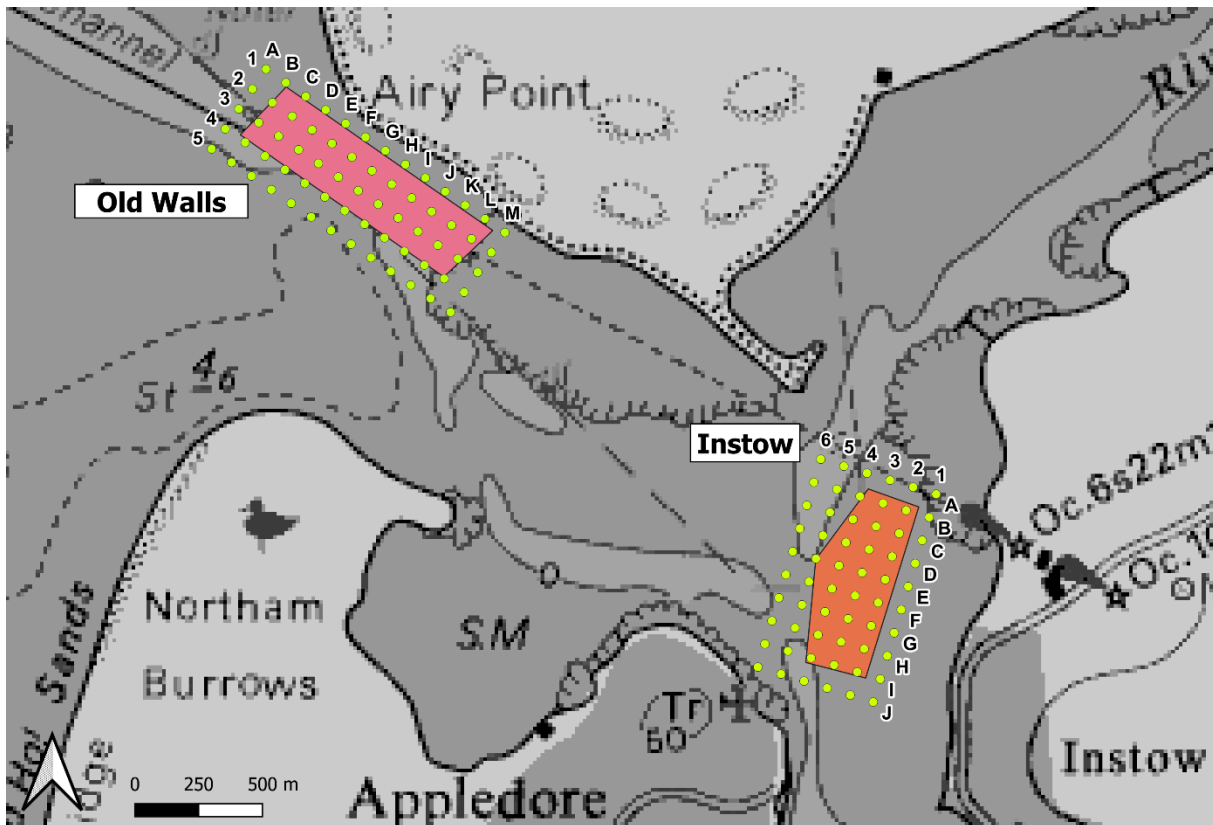


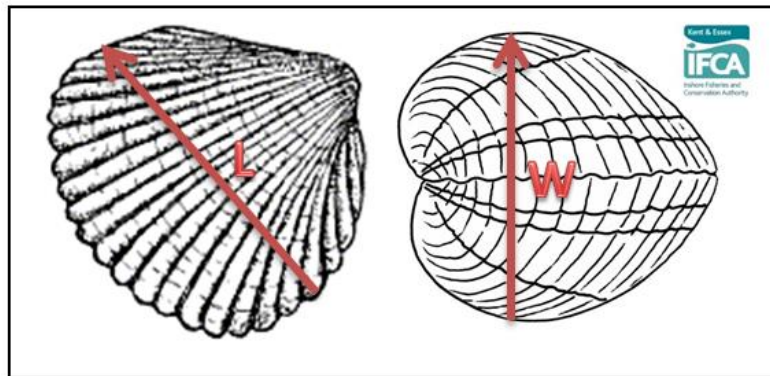
Figure 4: Survey locations at Instow (orange) and Old Walls (pink), with the grid of survey stations (approx. 93 m x 93 m apart).

Each survey station was located using a handheld GPS. A 0.1m<sup>2</sup> quadrat was randomly placed within 10m of the target position for the station. Using a trowel, the sediment was removed from the quadrat (to approximately the depth of the quadrat ~ 6 cm) into a sieve, and was then sieved in water nearby (Figure 5). Any cockles in the sample were put into a sample bag with a label of the station name (one bag per station). If no cockles were found or the station was unable to be surveyed it was noted as such.



**Figure 5 – Photos showing the cockle sampling method. (a) a 0.1m<sup>2</sup> quadrat is randomly placed within 10m of the target position for the sampling station, where sediment is dug out of the quadrat and placed in a sieve. (b) The sediment is sieved in water so that (c) the contents of the sieve are visible. Images taken from Exe cockle survey.**

For each station sample, all cockles were measured by callipers to the nearest millimetre for length and width (Figure 6).



**Figure 6 - Cockle length (L) and width (W) measurements.**

For each station sample, after measuring, cockles were sorted into age classes by determining how many annual growth rings were present on the shell. Growth rings usually appear each winter (0 rings = current year, 1 ring = 1st winter /1 year, 2 rings = second winter/ 2 years and so on). Each year group, from that station, was weighed separately (to the nearest 1g) and recorded. This was repeated for all station samples and once finished all the cockles were returned to the estuary.

### **2.1 Data Analysis**

R v3.6.1 or later (R Core Team, 2020) and QGIS v3.1 or later (QGIS, 2020) were used for data analyses. To visualise the variation in density across the sample sites, the density of cockles at each sample location was plotted on a map using Inverse Distance Weighted interpolation of per-station density. The size frequency distributions (length and width) of cockles were visualised using a histogram and the median length of cockles at each sample location was plotted on a map to visualise variation in the average size of cockles across survey locations.

Total biomass of cockles across the sampled area (23.4 ha) was calculated by scaling the mean cockle weight per station (0.1m<sup>2</sup>) to the total sampled area. The tonnage of prey-sized cockles (>15 mm) for wading birds on the estuary was calculated by multiplying the total tonnage by the proportion of prey sized cockles on the bed.

### 3. Results

A total of 37 stations were sampled at Instow, whereas only 17 were able to be surveyed at the Old Walls site (Figure 7). The non-surveyed stations at both sites were mainly inaccessible due to water; at the Old Walls site, the waters at low tide remained higher than usual due to a low pressure weather system and strong southerly/south-westerly wind. Of 37 the accessible stations at Instow, cockles were found at 27, whereas only one station contained one cockle at the Old Walls site (Figure 8). Some more cockles were found to the south-east of the outlined Old Walls Site, but these were not collected to be measured. Mussels were also present at both sites (stations B3, B4, C4, G3, G4, H2, H3, I2 at Instow, and south-east of the Old Walls survey location). These areas are not typically surveyed during D&S IFCA's annual mussel surveys.

The average density of cockles across the Instow area was 14.9 cockles per 0.1m<sup>2</sup> (Figure 9). The highest number of cockles found in one quadrat was 184. The smallest cockle found was 8 mm and the largest cockle found was 40 mm (Figure 10). The average length of cockles across the Instow area was 16.2 mm (Figure 11). The total tonnage of cockles across the surveyed area at Instow was estimated as 28.2 tonnes (35.8% of which were >15 mm in length), and the tonnage of cockles >15 mm was calculated as 10.1 tonnes. Most of the cockles found were in year class 1, and there were very few older, larger cockles found (Figure 12).

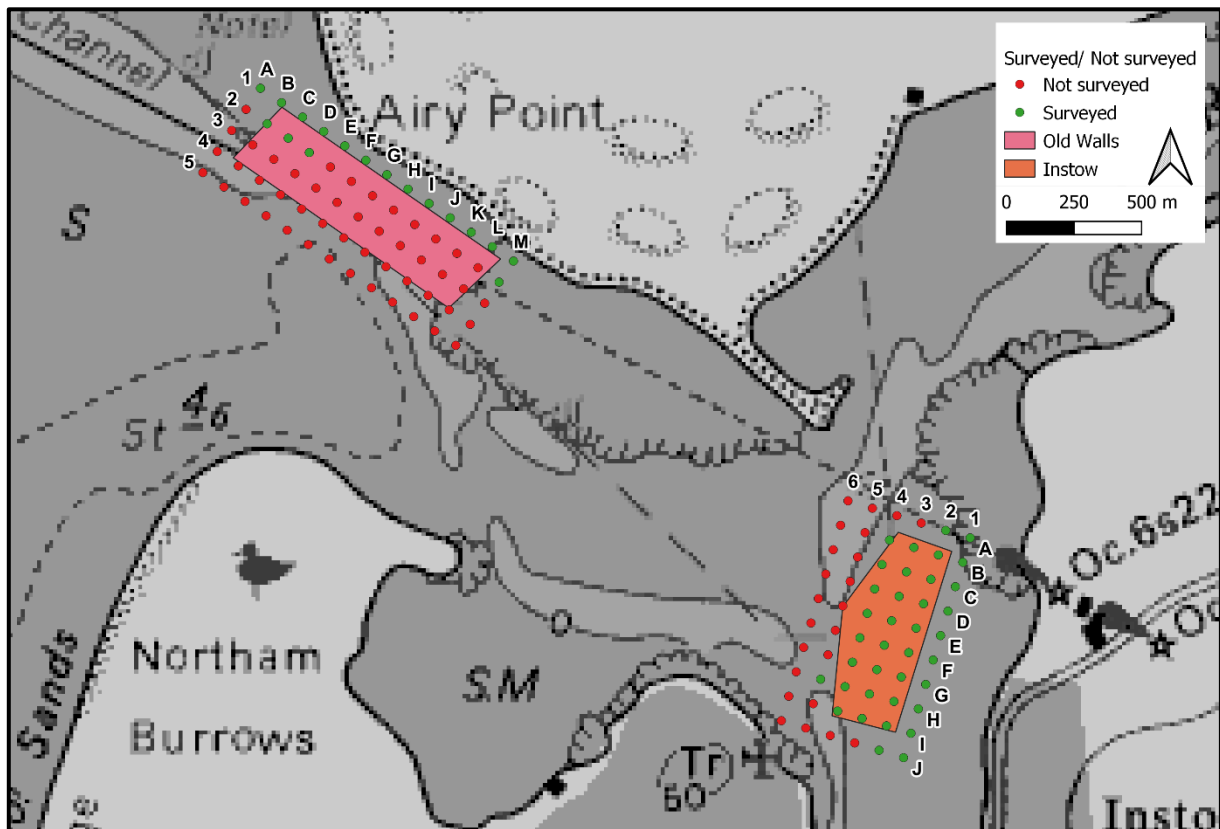


Figure 7: Stations at Instow and Oldwalls that were surveyed (green) and not surveyed (red). Stations that were not surveyed were either under the water or unreachable due to impassable water.

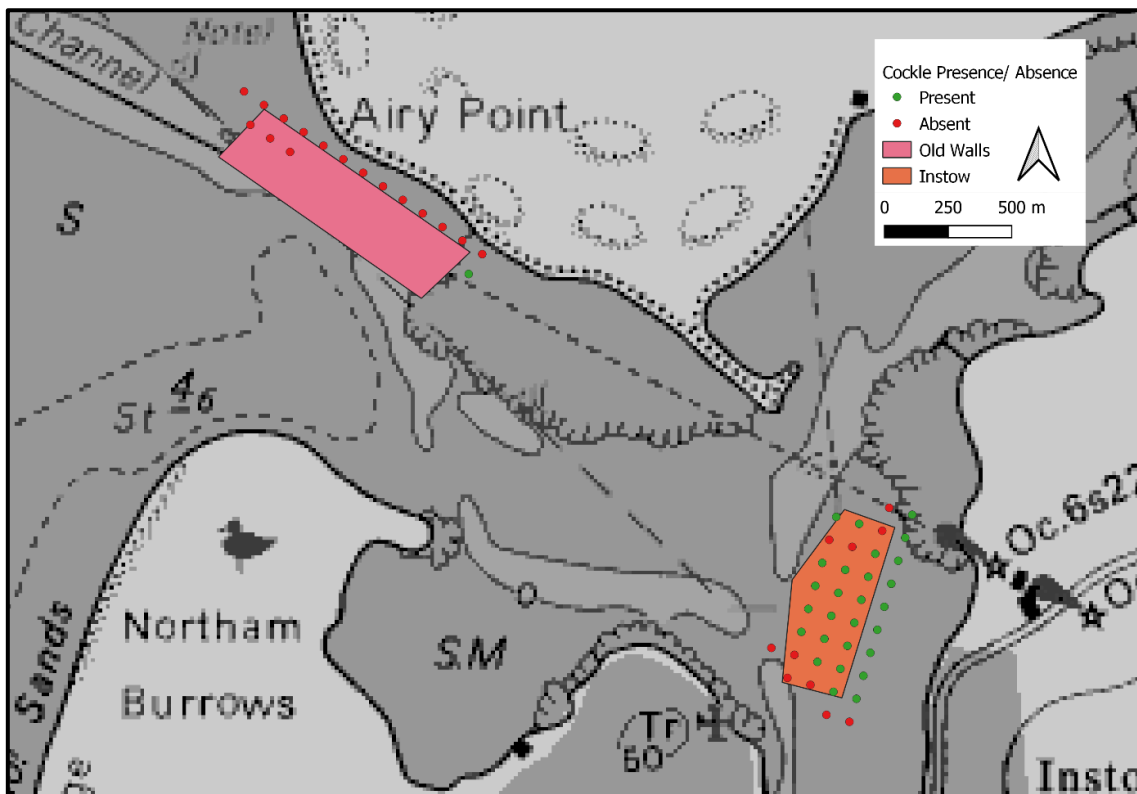


Figure 8: Survey stations at Instow and Old Walls where cockles were present (green) and absent (red).

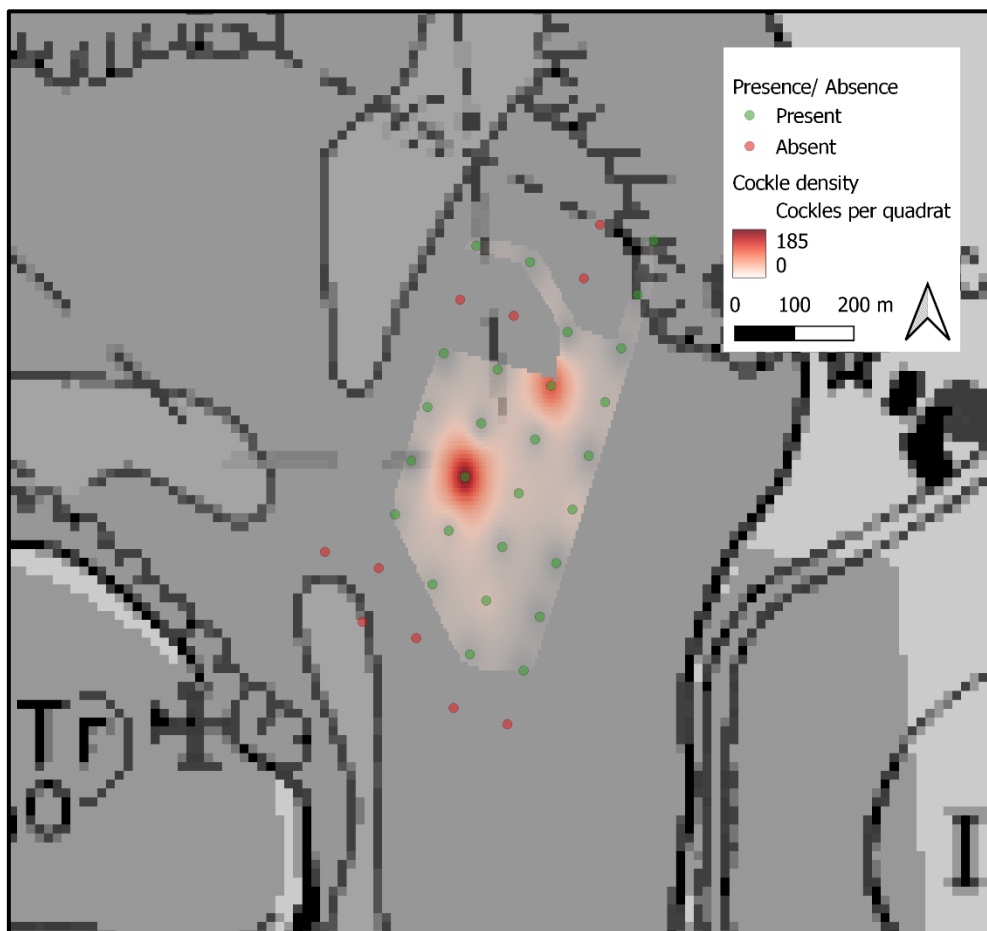
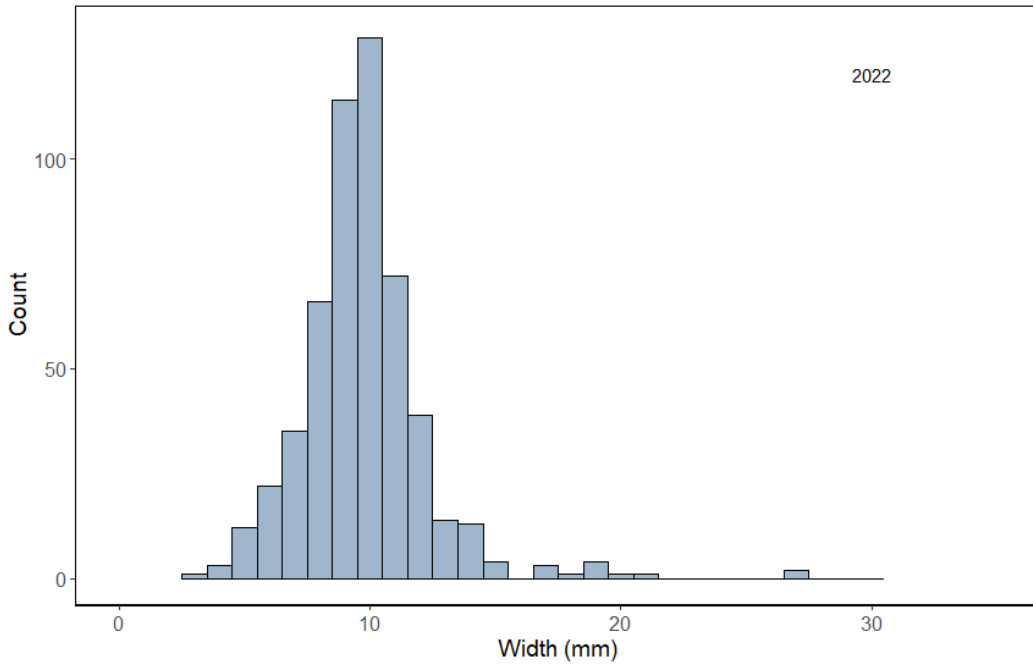
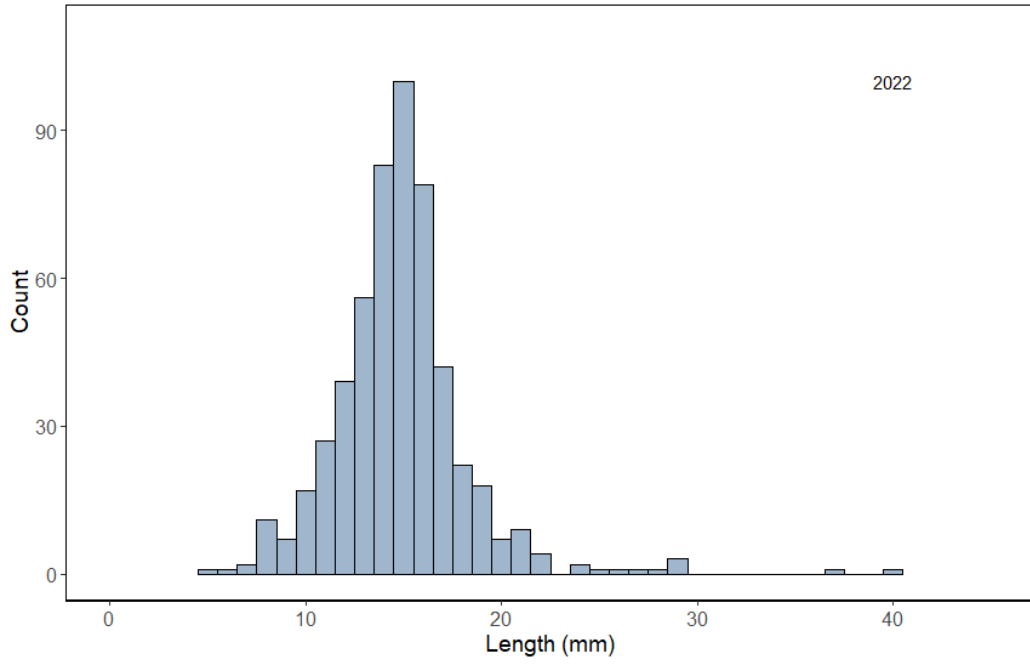
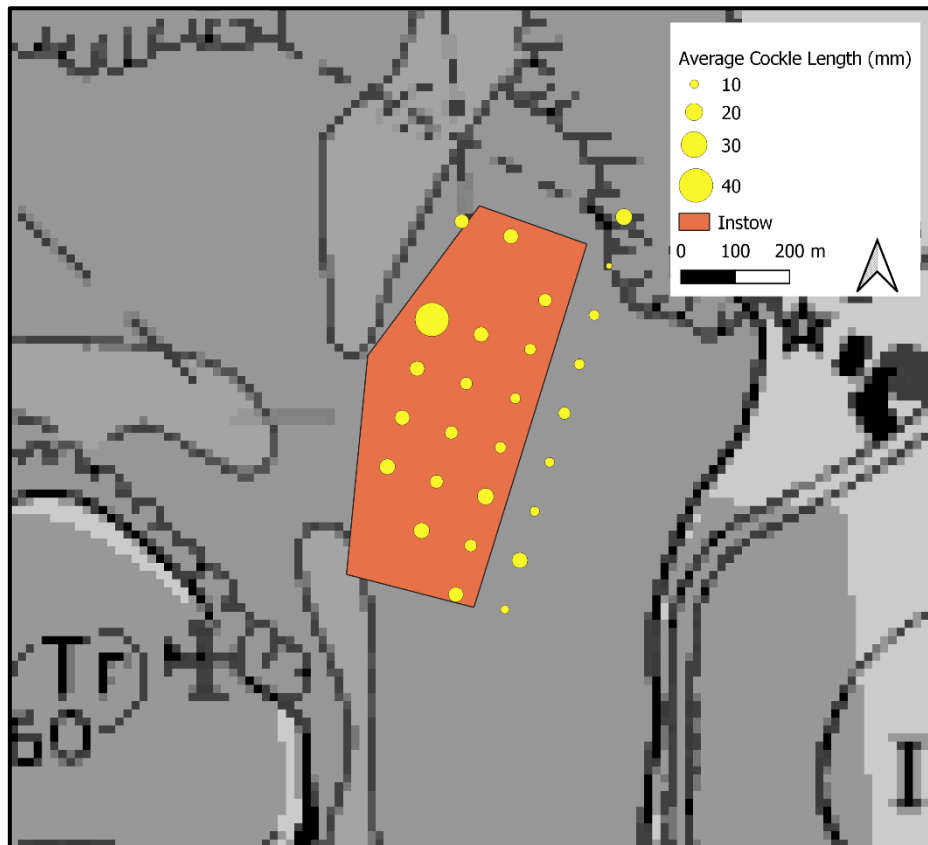


Figure 9 : Cockle density (number of cockles per 0.1m<sup>2</sup> quadrat) at Instow on the Taw Torridge Estuary mapped using Inverse Distance Weighted interpolation.

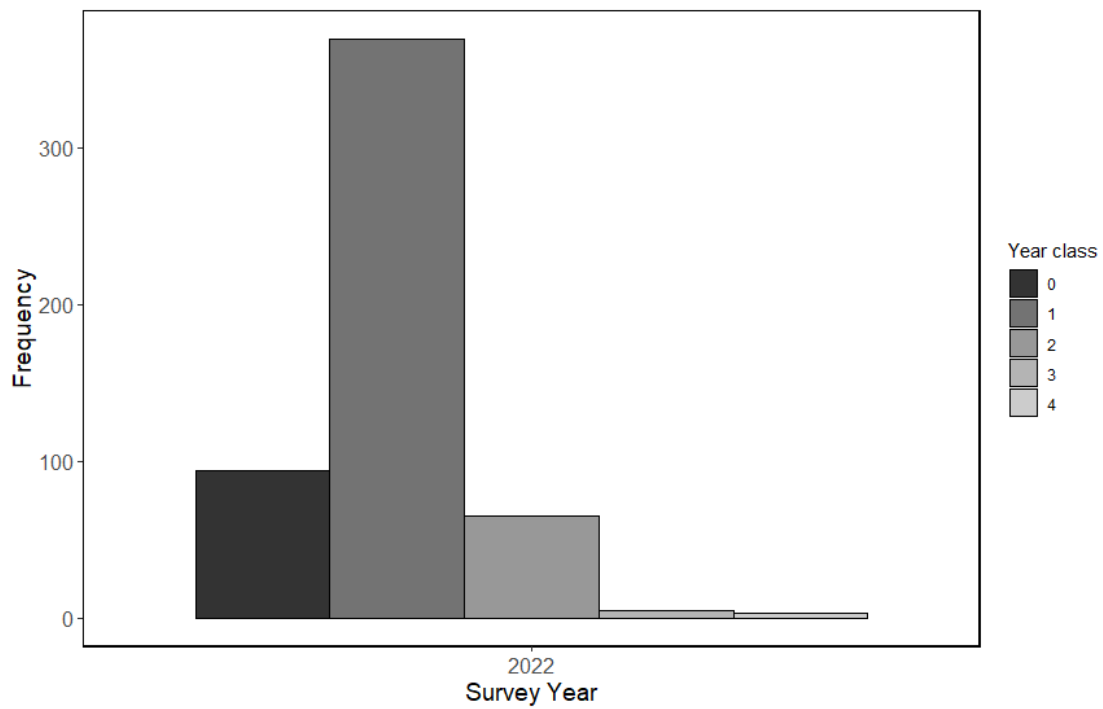




**Figure 10: Length and width (mm) of cockles sampled at Instow on the Taw Torridge Estuary.**



**Figure 11: Average length (mm) of cockles found at each survey station at Instow on the Taw Torridge Estuary. The size of the point is scaled to the average size of cockle.**



**Figure 12: Number of cockles in each year class for cockles sampled at Instow. Year classes are determined by counting the number of growth rings on a cockle's shell (0 rings = year 0, 1 ring = year 1, etc).**

## 4. Discussion

This is the first time cockles have been surveyed in the Taw-Torridge estuary by Devon and Severn IFCA. This is therefore the first of a series of annual reports which will monitor the change in density and average size of cockles across the Taw Torridge and discusses the implications for overwintering birds and other users of the estuary who gather cockles recreationally.

The sites chosen for this survey (Instow and Old walls) were chosen based on anecdotal information about areas that were historically known to contain cockles and where harvesting has been observed. The Instow site was accurately identified and will be revisited next year with some minor adjustments to the sample stations; the westernmost column of stations will be removed as these stations were all covered by water at low tide, and an extra column of stations will be added to the east to ensure the whole cockle bed is covered.

On the other hand, only one cockle was found at the Old Walls site as defined here, so these stations will not be revisited annually. However, some more cockles (and mussels) were found to the south-east of the area visited during the 2022 surveys, so this area south-east of Old Walls should be revisited and surveyed next year.

Cockle populations are naturally subject to high levels of variation, which is considered a normal feature of *Cerastoderma edule* populations. Therefore, observing the long-term population trends is therefore vital to understanding the population dynamics of any given cockle population (Jensen, 1992; Whitton *et al.*, 2015). Although there is currently no commercial fishery for cockles on the Taw-Torridge Estuary, D&S IFCA will continue the survey every year to monitor the cockle stocks on the estuary, with data being used as part of an annual assessment of the shellfish available for use as a prey resource by overwintering birds of the Taw-Torridge SSSI.

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