



Inshore Fisheries and  
Conservation Authority

## Camel Cockle Survey 2016



Field report for the Camel Cockle survey  
(20161017\_CIFCA\_FisheryAsses\_CamelCockle)

Completed by: Cornwall Inshore Fisheries and Conservation  
Authority (Cornwall IFCA)

Authors: Kimara Street, Colin Trundle, Annie Jenkin and Hilary Naylor

<b>Document History</b>			
Version	Date	Author	Change
0.1	6/12/16	K Street	Initial draft
0.2	12/12/16	K Street	Review and corrections
0.3	13/12/16	C Trundle	Minor additions
0.4	28/02/2017	H Naylor	QA
Final	09/03/2018	A Jenkin	Final QA

Cited as:

Street, K., Trundle, C., Jenkin, A and Naylor, H. 2016. Camel cockle survey. Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA), Hayle.

This document has been produced by Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA)

Cornwall IFCA  
Chi Gallos  
Hayle Marine Renewables Business Park  
North Quay  
Hayle  
Cornwall  
TR27 4DD

Tel: 01736 336842

Email: [enquiries@cornwall-ifca.gov.uk](mailto:enquiries@cornwall-ifca.gov.uk)

## Contents

<b>List of Figures</b> .....	<b>iii</b>
<b>List of Tables</b> .....	<b>iii</b>
<b>1 Project Background</b> .....	<b>1</b>
1.1 Aims and objectives.....	1
1.1.1 Aims.....	1
1.1.2 Objectives.....	1
<b>2 Methodology</b> .....	<b>1</b>
2.1 Equipment Specifications.....	1
2.2 Personal Protective Equipment (PPE).....	1
2.3 Methodology.....	2
2.4 Data handling.....	2
<b>3 Results</b> .....	<b>4</b>
<b>4 Discussion</b> .....	<b>7</b>
<b>5 Recommendations</b> .....	<b>8</b>
<b>6 Appendices</b> .....	<b>9</b>
Annex 1 -Survey Metadata.....	9

## List of Figures

Figure 1: Percentage of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17 <sup>th</sup> October 2016 by year class structure.....	4
Figure 2: Distribution of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17 <sup>th</sup> October 2016.....	5
Figure 3: Width frequency of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17 <sup>th</sup> October 2016.....	6
Figure 4: A Comparison of the percentage of total cockles made up of spat of the year from autumn surveys 2013 to 2016 carried out on the Camel Estuary cockle survey by Cornwall IFCA. (2013; total cockles n=483, 2014; total cockles n=129, 2015; total cockles n=54, 2016; total cockles n=40).....	6
Figure 5: Estimated tonnes of stock in autumn surveys carried out on the Camel Estuary cockle survey by Cornwall IFCA. ....	7
Figure 6: Year class composition per year in autumn surveys carried out on the Camel Estuary cockle by Cornwall IFCA. ....	7

## List of Tables

Table 1: Summary of results from a cockle survey carried out in the Camel Estuary by Cornwall IFCA on 17 <sup>th</sup> October 2016.....	4
--	---

## 1 Project Background

The cockle bed on Town Bar has been fished historically; however in recent years stocks have declined, possibly for similar reasons to the causes of cockle mortality experienced in other beds around the UK. In 2007 a methodology was developed to provide an estimate of fishable sized stock from which a Total Allowable Catch (TAC) could be set. Fishable cockles are those with a shell width of not less than 20mm, as required by Cornwall Inshore Fisheries & Conservation Authority (IFCA) Byelaw. In addition it was hoped that the survey would also provide an assessment of the total stock.

### 1.1 Aims and objectives

#### 1.1.1 Aims

- To make an assessment of the fishable stock of cockles (*Cerastoderma edule*) on Town Bar in the River Camel.

#### 1.1.2 Objectives

- From the survey results, be able to describe the population of cockles on the bed at the time of survey and how the results compare to previous year's results in light of mass mortality events.

## 2 Methodology

### 2.1 Equipment Specifications

- 1 x Garmin GPS 60 handheld GPS with sample stations preloaded as waypoints.
- 1 x Backup Garmin GPS 60 handheld GPS with sample stations preloaded as waypoints.
- Spare batteries.
- 1 x 0.1m<sup>2</sup> aluminium quadrat.
- 1 x 10mm screen sieve.
- 1 x 250mm width rake with shortened handle.
- 300mm x 200mm plastic sample bags.
- 25mm x 25mm blank waterproof paper labels
- 2 x Seawriter™ pencils

### 2.2 Personal Protective Equipment (PPE)

All staff involved in the field work were equipped with;

- Properly fitting chest waders.
- Oilskin smocks.

- Manual inflate lifejackets.
- Gloves.

In addition, the survey leader carried a VHF radio and hand bearing compass.

### 2.3 Methodology

The sample stations were preloaded onto the GPS units as waypoints. The stations were set out in five, south to north orientated transects with eight stations on each transect.

Using the 'Go To' function on the handheld GPS the furthest site was located by walking from the shore. Once the station was located, the quadrat was randomly placed on the sand and pushed into the sediment. Then, using the rake, all sediment to a depth of approximately 50mm within the quadrat was removed to the sieve.

The sediment was then carefully washed out using seawater in channels or remaining in depressions near to the survey station. Once all the sediment had been washed out, any live cockles retained in the sieve were transferred to a plastic sample bag. The site number was then written on a waterproof paper label and put into the bag with the cockles to identify the sample. The bag was then tied with an overhand knot and stowed for processing later.

On returning to base, each sample bag was processed in turn. The bag was emptied into the sieve and then washed to remove any remaining sediment from the shells.

The cockles were sorted into year classes using the annuli as a means of estimating the age of each individual. Cockles of less than one year old were considered juvenile spat. The cockles were then measured for width and length using a Vernier calliper, the width being the greatest measurement of the 2 valves together and the length being the greatest dimension of a single valve.

Once measured, the individuals in each year class were then sub divided into those that were of or larger than the 20mm minimum size and those that were smaller than the minimum size. Each sub group was then weighed using a set of electronic 5kg x 0.001kg scales. The measurements were recorded on a pre-prepared log sheet. The numbers and weights of each of the year class groups were also recorded.

This process was repeated for each sample.

### 2.4 Data handling

The data was entered into a pre-prepared recording sheet, which was later transferred to an Excel file containing the GPS locations of all of the sample stations. When all data had been added to the Excel datasheet it was then transferred to GIS to allow estimations of the cockle density distribution to be made. The cockle data was opened in MapInfo (MapInfo Professional Version 11) and points created over a chart of the area.

Vertical Mapper was used to create a colourised grid of the selected values from each sample station. The colourised grid was generated by using Natural Neighbour interpolation method. A pre generated standardised .vcp colour palate was applied to the grid to allow the corrected density contouring to be viewed. From this modified colourised grid, it was possible to estimate the area of coverage of the selected values.

### 3 Results

Since the spring 2016 survey the channel has continued migrating west resulting in the loss of 11 sites in the north east and four sites in the south west, whilst on site officers witnessed the channel eroding the bank further. Fishable stock estimation is 5.3 tonnes (Table 1). It is assumed, as with previous years, that cockle may be settling out in the area to the north of the channel, however it was not possible to survey at this time.

Table 1: Summary of results from a cockle survey carried out in the Camel Estuary by Cornwall IFCA on 17<sup>th</sup> October 2016

	<20mm width	>= 20mm width
<b>Number of sites yielding cockles</b>	10	16
<b>Maximum Density</b>	30 cockles/m <sup>2</sup>	30 cockles/m <sup>2</sup>
<b>Mean weight</b>	64 g/m <sup>2</sup>	189.5 g/m <sup>2</sup>
<b>Area of coverage</b>	0.97ha	2.24ha
<b>Stock estimation</b>	0.62 tonnes	5.3 tonnes

Eight sites yielded cockles of the 2016 year class (Figure 1), 32.5% (n=13) of the total number of cockles, of which 7.69% (n=1) has attained fishable size. 75% (n=6) of the 2015 year class have attained fishable size, and 100% of both the 2014 (n=13) and 2013 (n=6) year classes.

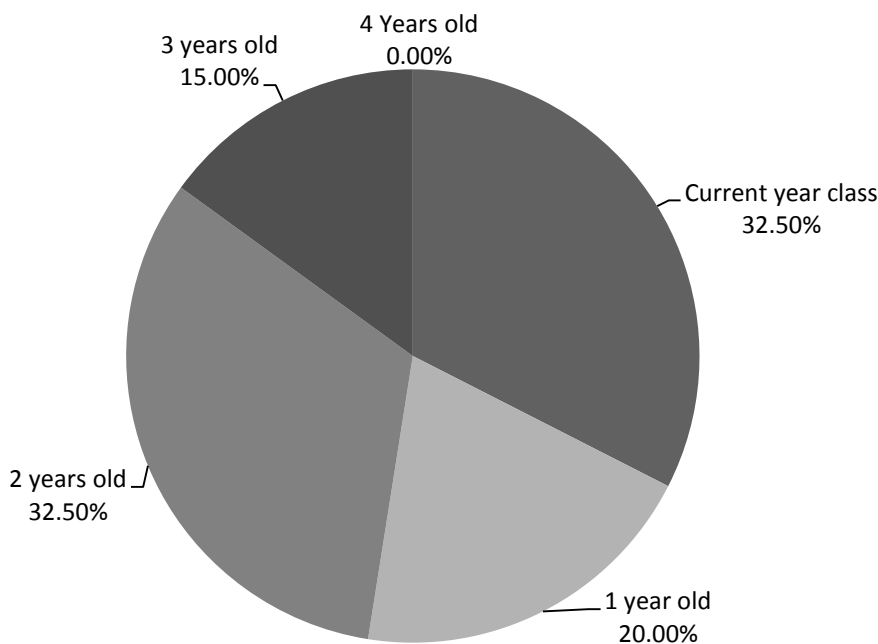


Figure 1: Percentage of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17<sup>th</sup> October 2016 by year class structure

Estimations of the cockle density distribution were made in relation to the all cockles present, the 2016 year class, cockles with <20mm and >20mm shell width (Figure 2).



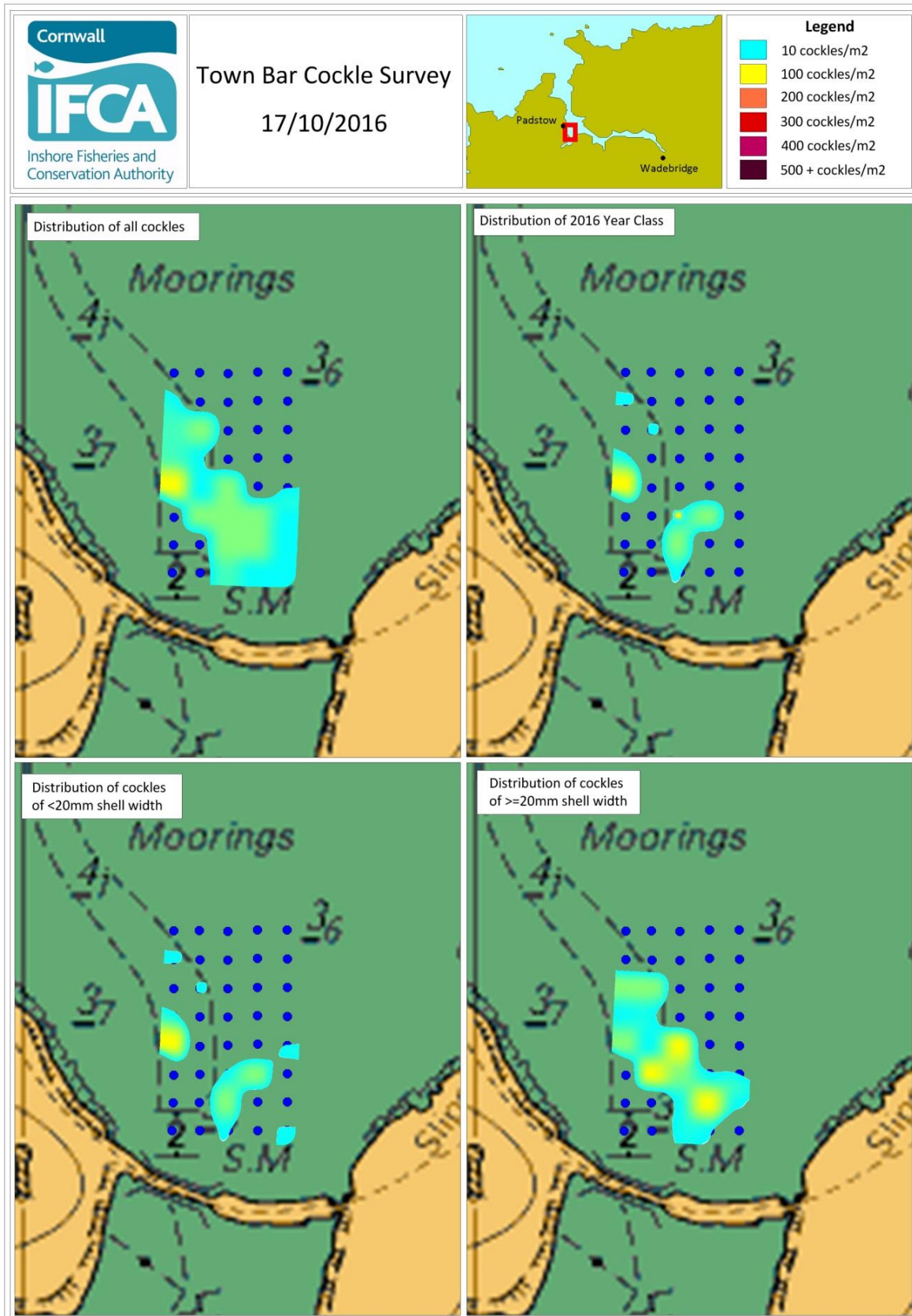


Figure 2: Distribution of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17<sup>th</sup> October 2016.

Of the accessible 25 sites, 19 yielded cockles. A total of 39 cockles were recorded with a mean size of 21mm for all cockles, 14mm for the current year class and 24mm for the cockles one year and older (Figure 3).

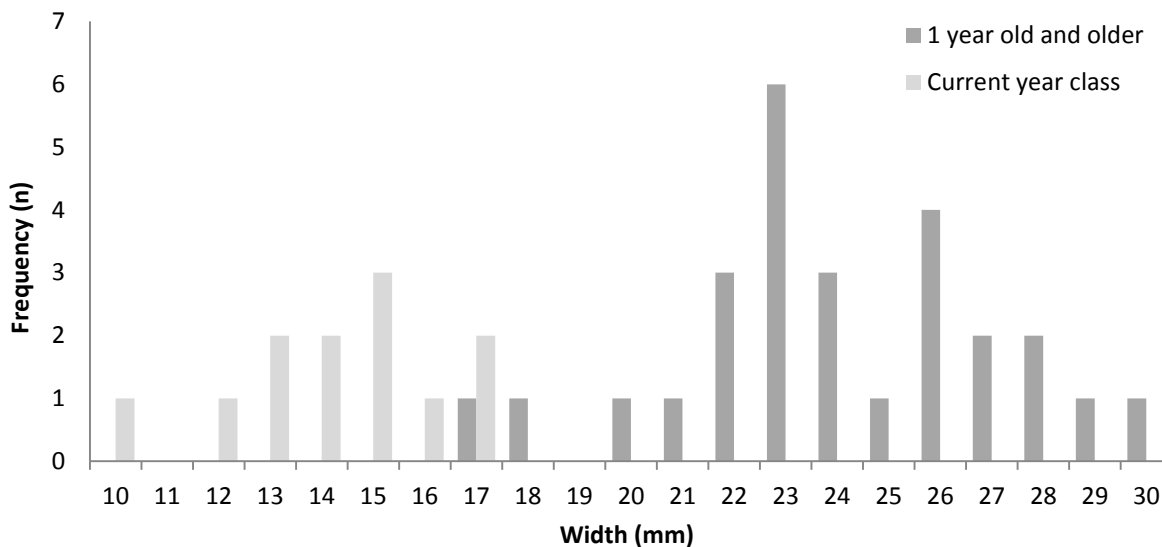


Figure 3: Width frequency of cockles sampled during the Camel Estuary cockle survey by Cornwall IFCA on 17<sup>th</sup> October 2016.

Comparisons of the percentage of cockles made up of spat recorded during previous autumn surveys on the Camel Estuary have considerably decreased from 2013 to 2015 with a small increase in 2016’s survey (Figure 4).

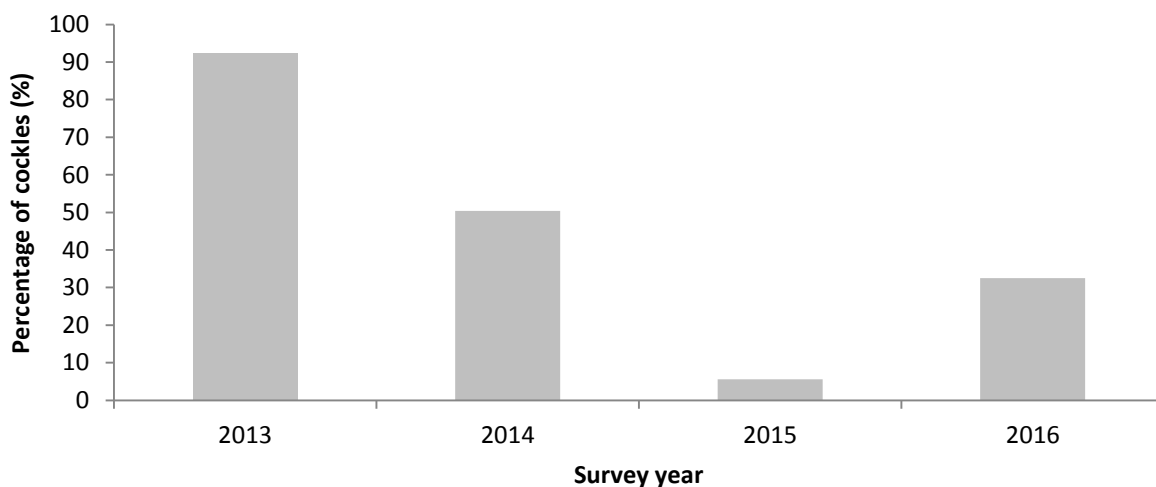


Figure 4: A Comparison of the percentage of total cockles made up of spat of the year from autumn surveys 2013 to 2016 carried out on the Camel Estuary cockle survey by Cornwall IFCA. (2013; total cockles n=483, 2014; total cockles n=129, 2015; total cockles n=54, 2016; total cockles n=40).

Estimated tonnes of pre recruit stock from previous autumn surveys have dramatically decreased from 2013 to 2015 with a slight increase in 2016’s survey, while fishable stocks remained similar with a slight increase in 2015, however this increase then lowered in 2016 (Figure 5).

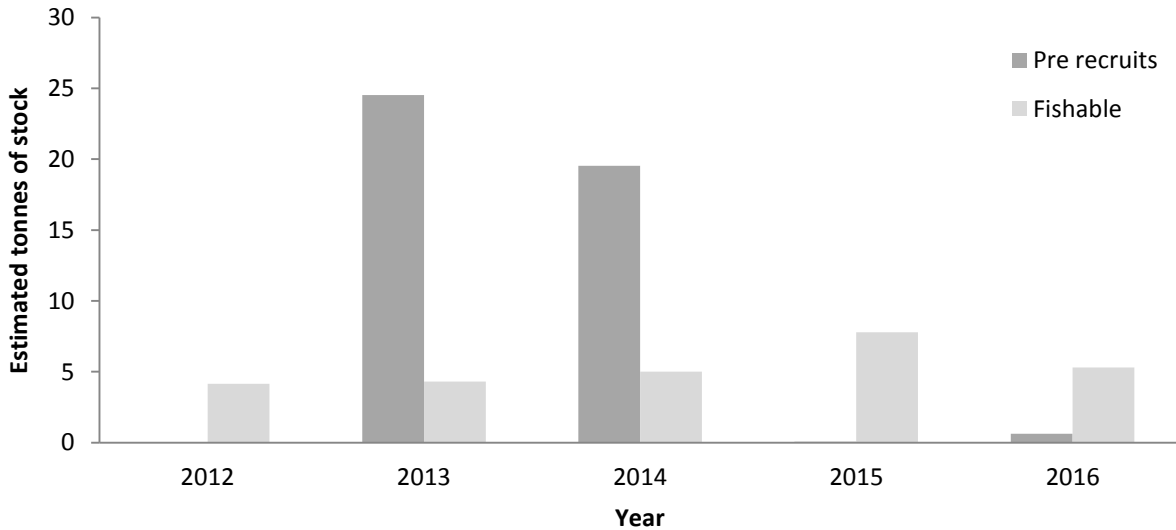


Figure 5: Estimated tonnes of stock in autumn surveys carried out on the Camel Estuary cockle survey by Cornwall IFCA.

Year class composition from autumn surveys from 2013 to 2016 have shown a dramatic decrease in the number of cockles recorded with the current year class, a decline of those one year old, an increase in those of two years old and a decrease with a minimal increase of those that are 3 years old in 2016 (Figure 6).

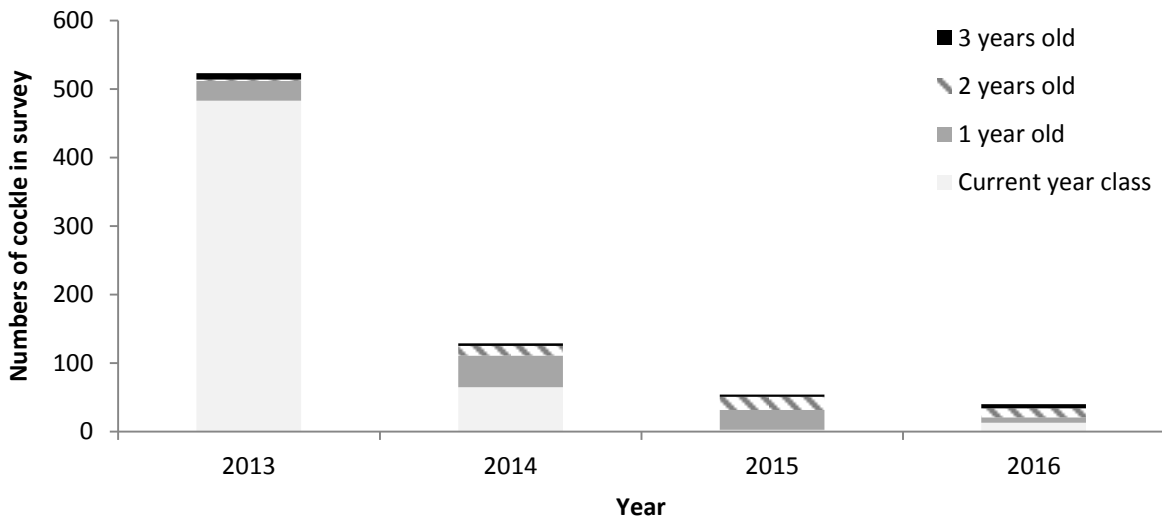


Figure 6: Year class composition per year in autumn surveys carried out on the Camel Estuary cockle by Cornwall IFCA.

#### 4 Discussion

The settlement of spat in the 2015 survey was notably low, and this year class has continued to yield poor numbers and weights, only making UP 20% of the total numbers, compared to 2014 cockles making up 32.5% of the total number. It is expected that this poor recruitment in 2015 will be apparent in future surveys.

The spat settlement for 2016 appears to be greater than in 2015, however it is lower than 2014 and 2013 (Figure 4). This general downward trend is likely because of the loss of a large portion of the site and change in

hydrology of the remainder. It is possible more spat may be successfully settling out to the north of the channel as suggested previously.

The estimated fishable stock has decreased from 2015 (Figure 5). It may be that in 2017 the fishable stock is depleted further due to the low spat fall in 2015 as the majority of cockles on this bed attain recruit to the fishery by age two.

In 2015 fishable stock was made up mostly of two year classes by weight (2014 and 2013, 45% and 46% respectively (Figure 6). In 2016 the fishable stock is composed of three year classes; a majority 2014 year class (52%) with 20% and 27% of 2015 and 2013 respectively.

## 5 Recommendations

The bed does not currently have shellfish waters classification, meaning that no cockles can be removed for sale. It is recommended that the surveys be continued to monitor the stock on the beds as it will therefore allow the Cornwall IFCA to make informed management decisions as to the future of this potential fishery. It is proposed to carry out a scoping survey to attempt to identify any shift in the normal cockle spat settlement patterns in the estuary.

## 6 Appendices

### Annex 1 -Survey Metadata

Site	Long	Lat	# Cockles >=20mm	# Cockles <20mm
A1	-4.93028	50.53037	Site lost to channel	
A2	-4.93025	50.53073	Site lost to channel	
A3	-4.93024	50.53109	0	0
A4	-4.93024	50.53147	2	3
A5	-4.93024	50.53184	1	1
A6	-4.93024	50.5322	2	0
A7	-4.93024	50.53258	0	1
A8	-4.93024	50.53295	0	0
B1	-4.92971	50.53037	Site lost to channel	
B2	-4.92972	50.53073	Site lost to channel	
B3	-4.92972	50.5311	3	0
B4	-4.92972	50.53146	1	0
B5	-4.92972	50.53184	1	0
B6	-4.92972	50.5322	2	1
B7	-4.92972	50.53257	Site lost to channel	
B8	-4.92972	50.53295	Site lost to channel	
C1	-4.92914	50.53037	1	1
C2	-4.92914	50.53074	1	2
C3	-4.92914	50.5311	2	1
C4	-4.92915	50.53147	3	0
C5	-4.92915	50.53183	0	0
C6	-4.92915	50.5322	0	0
C7	-4.92915	50.53257	Site lost to channel	
C8	-4.92915	50.53294	Site lost to channel	
D1	-4.92855	50.53037	1	0
D2	-4.92854	50.53074	3	0
D3	-4.92854	50.53111	1	2
D4	-4.92854	50.53149	0	0
D5	-4.92855	50.53185	0	0
D6	-4.92855	50.53222	Site lost to channel	
D7	-4.92855	50.53259	Site lost to channel	
D8	-4.92855	50.53296	Site lost to channel	
E1	-4.92795	50.53038	0	1
E2	-4.92794	50.53074	1	0
E3	-4.92794	50.5311	1	0
E4	-4.92794	50.53147	0	1
E5	-4.92794	50.53184	Site lost to channel	
E6	-4.92794	50.53222	Site lost to channel	
E7	-4.92794	50.53258	Site lost to channel	
E8	-4.92795	50.53296	Site lost to channel	
<b>SUM</b>			<b>26</b>	<b>14</b>