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# Solent Oyster Stock Assessment

Summer 2019



This report has been produced by the Southern Inshore Fisheries and Conservation Authority.

A copy of this report is available on our website at [www.southern-ifca.gov.uk](http://www.southern-ifca.gov.uk) or from the Southern IFCA Office at:

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## 1. Introduction

The following report assesses the distribution and abundance of the native oyster over time to evaluate their population health and stability in SIFCA's district, investigating the sustainability of local oyster dredge fisheries too. In 2019, the oyster surveys were performed in the North Solent, West Solent, Central Solent, Southampton Water, Portsmouth Harbour and Langstone Harbour during July-August 2019. The data collected in the survey will contribute to an ongoing time series, developing our knowledge of the population dynamics seen in the local native oyster, therefore allowing for the development of local management strategies that aim to encourage the populations recovery and allow for a sustainable fishery.

### 1.1. The Fishery

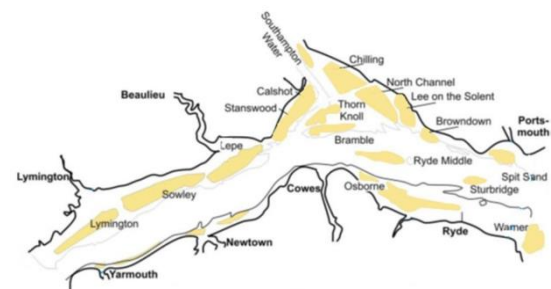
30 years ago, the Solent used to be the largest native oyster fishery in Europe; however, the fishery collapsed in 2007 and was temporarily closed in 2013. Now, the Solent oyster fishery is closed annually between March 1st and October 31st due to the Oyster Closed Season Byelaw, that ensures the protection and recovery of important seabed features. Further measures include a Minimum Landing Size of 70mm which protects the smaller individuals within the population, therefore preventing a complete collapse of the fishery and permanent closed areas covered by the Bottom Towed Fishing Gear Byelaw 2016, introduced to protect important habitats such as seagrass beds, saltmarsh and low energy estuarine habitats.

The oyster fishery is dominated by smaller fishing vessels that utilise a ladder dredge towed by the stern. The front blade of the dredge can be no longer than 1.5m (Oyster dredges byelaw), restricting catch per unit effort and ensuring the stability of the fishery.

Even though the survey covers the majority of the Solent, very few oyster beds are open to the traditional oyster fishery annually. Management over the past five seasons has implemented spatiotemporal limitations on the oyster fishery within Portsmouth and Langstone harbour, closing the majority of the beds with some exceptions depending on the year (Portsmouth, Langstone and Ryde Middle).



**Figure 1.1-** An image displaying the right valve of a native oyster dredged on the survey.



**Figure 1.2-** A map of the Solent with areas surveyed highlighted in yellow.



**Figure 1.3-** The surveys ladder dredge about to be emptied on to the sorting table for investigation.

## 1.2. The Solent

The Solent is a strait of water that separates England from the Isle of Wight, connected to the Solent is a number of estuaries including Southampton water (Fig 1.3). The Solent a mixed and diverse fishing industry targeting many species using different methods.

The Solent hosts a number of important habitats such as mudflats and sea grass beds. As a result it is home to a number of Marine Protected Areas (MPAs). These include the Solent European Marine Site (EMS) (Southern IFCA, 2019) made up of Portsmouth Harbour SPA, Solent and Southampton Water SPA, Chichester and Langstone Harbour SPA and Solent Maritime SAC. The Solent also includes nationally designated Marine Conservation Zones (MCZs) including Yarmouth to Cowes MCZ and Bembridge MCZ protecting 16km<sup>2</sup> and 75km<sup>2</sup> respectively. Both of which were

protected for various features, but include the native oyster (DEFRA, 2018; DEFRA, 2019).

## 1.3. Current management

Presently, there is a management strategy in place that promotes the sustainable regulation of the native oyster fishery within the Solent. The relevant management measures enforced include:

- **Fishing season-** November 1<sup>st</sup> to February 28<sup>th</sup> (Oyster Closed Season Byelaw); shellfish beds can also be closed by SIFCA's committee if the population has been determined to be severely depleted so as to ensure recovery (Temporary closure of shellfish beds byelaw)
- **Gear type-** Front blade <1.5m on each dredge (Oyster dredges byelaw)
- **Minimum size-** 70mm (Oyster MLS byelaw)
- **Bottom Towed Fishing Gear Byelaw 2016 –** Various closed areas to Bottom Towed Fishing Gears (including shellfish dredging) throughout the Solent to protect Seagrass Beds, Saltmarsh and Low energy estuarine environments.

Further information on present management measures within the Solent can be found on the Southern IFCA website at <http://www.southern-ifca.gov.uk/byelaws>.

## 2. Methodology

### 2.1. Survey

The survey is undertaken annually on neap tides during Jul or August. The

2019 survey took place between the 29th July and 5th August. An oyster survey was previously undertaken by CEFAS until 2011, but was discontinued following the decline of the oyster populations and removal of the Solent regulating order for oysters. Southern IFCA took over the survey in 2014 in order to provide data to inform its management. The present survey is based on the old CEFAS survey, with only a few changes to the methodology and the addition of new sites.

The survey visits a number of historic stations, at each station a dredge tow is completed for approximately 2 minutes. Before each trawl, the station number and site are noted then once the trawl starts, a GPS is used to record the start longitude and latitude as well as time, all of which are logged on the log sheet. The dredge used is a ladder dredge, typically used by oyster fishers in the Solent. At the end of the trawl, the end longitude, latitude and time are noted, meanwhile the dredge is retrieved and emptied onto the sorting table where photographs of the load are taken for future reference. The sediment type is then assessed using a presence/absence quantitative scale, that measures relative abundances of sediment types including mud, sand, rock and shell and other contents such as slipper limpet, starfish and weed on a 0-5 scale. The load is then sorted through and any oysters and other species of commercial interest are then removed. The oysters are measured at their widest point using Vernier callipers to the closest millimetre and separated into tow buckets: above and below 70mm. The two buckets are then separately weighed, and the oysters are safely returned.

## 2.2. Equipment

The surveys ladder dredge caught oysters and other species of interest of all sizes but was more prone to catching bigger individuals, creating some bias. However, the ladder dredge used is representative of the equipment used in the Solent's present oyster fishery, so this bias is negligent and allows a fairer verdict on relevant management decisions.

Dredge efficiency was not accounted for in the stock assessment because dredge efficiency is very variable due to changes in seabed type, tow duration and tow speed. As a result, any predictions of dredge efficiency would most likely be wrong, skewing the results.

## 2.3. Data Analysis

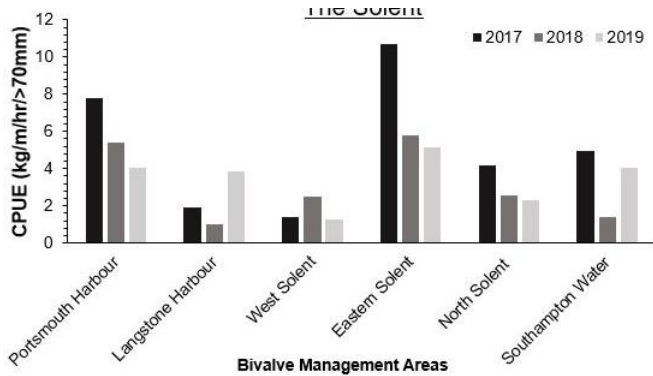
The data was inputted into Microsoft excel, where CPUE (Catch Per Unit Effort) and other important factors were calculated, allowing spatiotemporal analysis between beds and areas.

Most of the factors inputted were already standardised; however, CPUE had to be standardised to allow a fair comparison. The units for CPUE is kg/m/hr, since the dredge was 1.2m in length, the data was standardised down to 1m. In addition, the tow duration varied between 1 to 3 minutes at each station so was standardised to 1 hour. CPUE better represents spatial differences in distribution and abundance of the native oyster, allowing for a better comparison.

## 3. Results

In Summer 2019, 201 sites were surveyed in five days over an eight-day

period. For purpose of analysis, the sites were divided into the following beds: Portsmouth Harbour, Langstone Harbour, West Solent, East Solent, North Solent and Southampton Water.



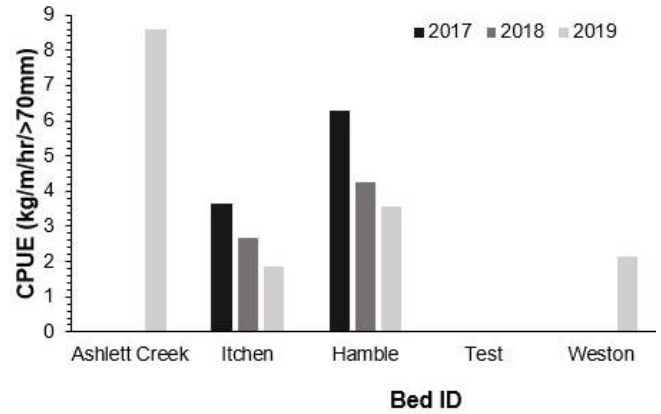
**Figure 3.1-** The CPUE of all the bivalve management areas in the Solent from 2017-2019.

In the past three years, the CPUE has decreased in Portsmouth Harbour, East Solent and North Solent, whilst the CPUE of Southampton Water and the West Solent has fluctuated but decreased overall. Langstone Harbour is the only management area with an increasing CPUE, although the catches compared to some other beds still remains low. Generally, the CPUE has decreased over the last three years, with a 5 kg/m/hr difference between the highest CPUE in 2017 and 2019.

A closer look at the beds within each management area deepens our understanding of these changes.

### 3.1. Southampton Water

Southampton Water's CPUE has seen an overall decrease; however, the lowest CPUE was in 2018 (1 kg/m/hr) with an increase seen in 2019 (3.5 kg/m/hr) (Figure 3.1).

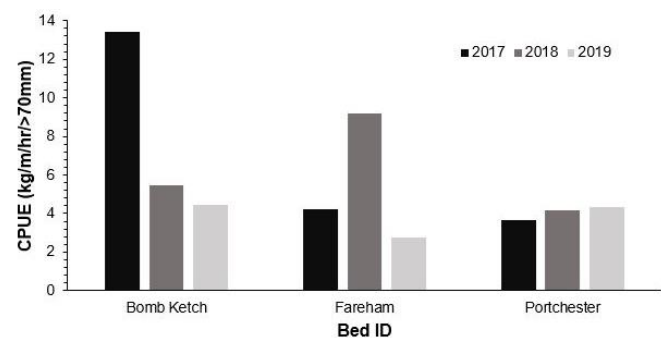


**Figure 3.1.1-** The CPUE of the beds within Southampton Water between 2017-2019.

Over the three years, no oysters were sampled in the Test, whilst Weston and Ashlett Creek only caught oysters in 2019. Ashlett Creek even achieving the highest CPUE over the three-year period (8.5 kg/m/hr). The Itchen and the Hamble have consistently dredged oysters but with a decreasing CPUE annually, 3.5 to 2 kg/m/hr and 6.5 to 3.5 kg/m/hr respectively over the three years.

### 3.2. Portsmouth Harbour

Portsmouth Harbour has seen a steady decrease from 8 to 4 kg/m/hr over the last three years (Figure 3.1).



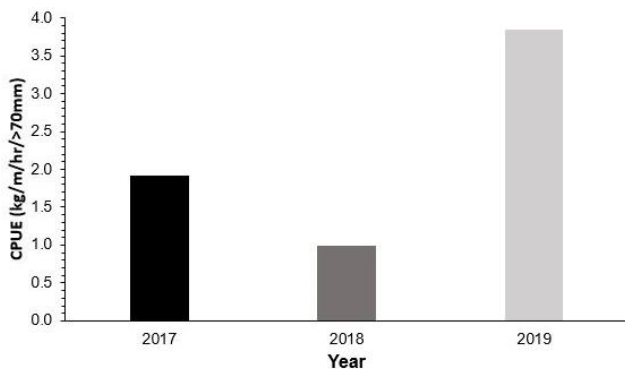
**Figure 3.2.1-** The CPUE of the beds within Portsmouth Harbour between 2017-2019.

Bomb Ketch had the highest CPUE with 13 kg/m/hr in 2017 but has since decreased annually, reaching 4 kg/m/hr in 2019. Overall, the CPUE of Fareham has also decreased from 4 kg/m/hr in

2017 to 2 kg/m/hr in 2019; however, a high CPUE of 8.5 kg/m/hr was recorded in 2018. Portchester has displayed a slow increase in CPUE annually of about 0.2 kg/m/hr.

### 3.3. Langstone Harbour

Langstone Harbour experienced its highest CPUE in 2019 at 3.6 kg/m/hr, despite a reducing CPUE the previous year (Figure 3.1).

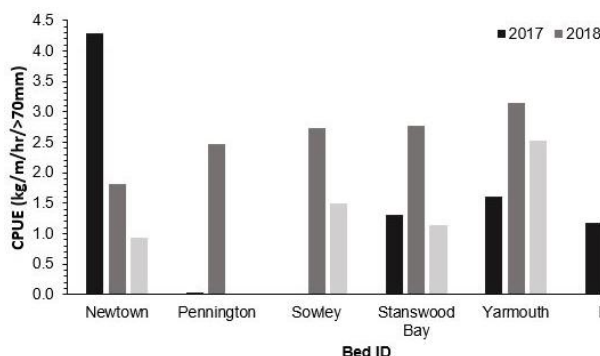


**Figure 3.3.1-** The CPUE of the beds within Langstone Harbour between 2017-2019.

Between 2017 and 2018, Langstone Harbour's CPUE decreased from 1.8 kg/m/hr to 1 kg/m/hr; however, increased slightly in 2019 from 1 to 3.6 kg/m/hr.

### 3.4. West Solent

In 2018, the West Solent achieved its highest annual CPUE of 2 kg/m/hr, double that of 2017 and 2019 (1 kg/m/hr) (Figure 3.1).

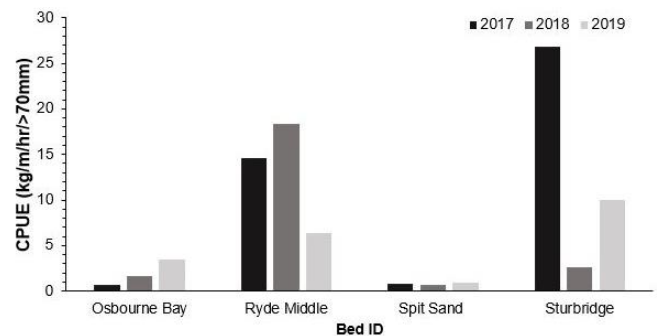


**Figure 3.4.1-** The CPUE of the beds within the West Solent between 2017-2019.

Newtown and Sowley illustrate a decreasing CPUE annually, decreasing from 4.3 to 0.8 kg/m/hr and 2.5 to 1.4 kg/m/hr respectively between 2017 and 2019. Every bed with the exception of Newtown had its highest CPUE in 2018, averaging about 2 kg/m/hr. However, every bed yielded a lower CPUE in 2019, especially Pennington which decreased from 2.5 to 0 kg/m/hr between 2018 and 2019.

### 3.5. East Solent

The East Solent had the highest CPUE in 2017 at 10 kg/m/hr; however, the CPUE decreased in 2018 and 2019, yielding just above half of the 2017 figure (6 kg/m/hr) (Figure 3.1).

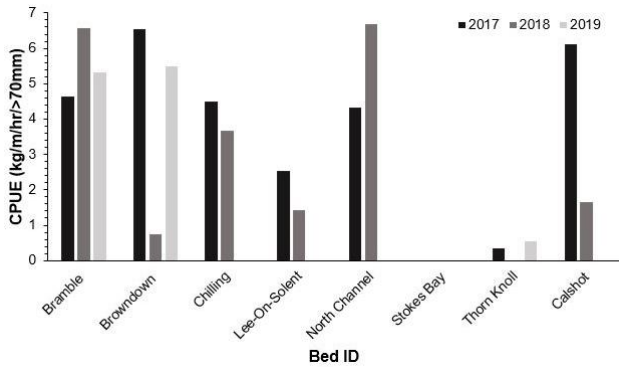


**Figure 3.5.1-** The CPUE of the beds within East Solent between 2017-2019.

Annually, Osbourne Bay remains low compared to Ryde and Sturbridge but does show a small increase each year in CPUE (1 kg/m/hr). On the other hand, Spit Sand has remained around 1 kg/m/hr. Ryde Middle has undergone an overall decrease in CPUE over the three years, from 15 to 5 kg/m/hr; however, in 2018 experienced a high of 18 kg/m/hr. Sturbridge had the highest CPUE in 2017 at 26 kg/m/hr; however, this decreased to 4 kg/m/hr by 2018. In 2019 Sturbridge's CPUE was close to 10 kg/m/hr but still not near 2017 levels.

### 3.6. North Solent

The North Solent's CPUE has slowly decreased over the three years from 4 kg/m/hr in 2017 to 2 kg/m/hr in 2019 (Figure 3.1).



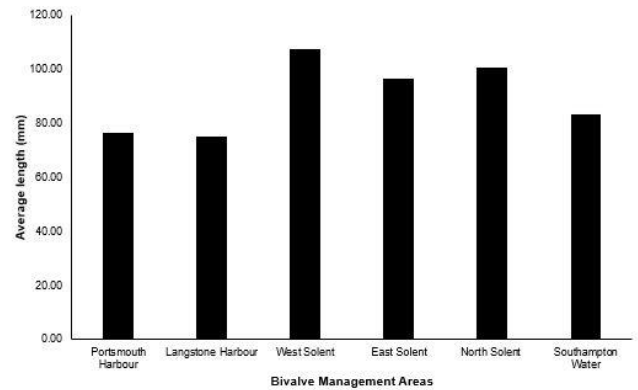
**Figure 3.6.1-** The CPUE of the beds within North Solent between 2017-2019.

Over the three years, no oysters were dredged at Stokes Bay and very few at Thorn Knoll (<1 kg/m/hr). Bramble consistently returned oysters, always exceeding 4 kg/m/hr, whilst Calshot sampled some oysters in 2017-2018 but failed to return any oysters in 2019. Browndown is the only bed with an increasing CPUE, increasing from 0.5 kg/m/hr in 2018 to 5.5 kg/m/hr in 2019. In 2019, Chilling, Lee-On-Solent and North Channel were not surveyed due to cable works associated with the IFA2 cable works (ABP Southampton, 2019).

### 3.7. Average lengths

The average lengths of native oysters within the bivalve management areas varies considerably. The West Solent had the largest oysters on average (110mm), closely followed by the North Solent and East Solent (~100mm). On the other hand, Portsmouth Harbour and Langstone Harbour had the smaller oysters, on average below 80mm,

indicating small scale recruitment in these areas.



**Figure 3.7.1-** The average lengths of native oysters at each bivalve management area in 2019.

## 4. Discussion

In comparison to the CPUE levels of 2017 and 2018, it is safe to assume that in 2019 all except Langstone Harbour have experienced a decrease in CPUE. In addition, the CPUE never exceeded 15 kg/m/hr, a figure used by Southern IFCA to indicate some level of commercial fishing may be possible. In fact, the average CPUE of the whole district is 3.4 kg/m/hr, therefore the fishery has shown none or little signs of recovery over the past three years. Ryde Middle which has been a historic bed that consistently hosts a large native oyster population has even decreased to 5 kg/m/hr in 2019. In addition, only 33% of tows successfully dredged oysters (annex 1), a very low statistic for a fishery that was once the largest in Europe.

The high weight yet low frequency of the oysters captured suggest most of the oysters were of an older generation and little recruitment was shown. Except in Langstone Harbour and Portsmouth Harbour where several juvenile oysters were dredged showing promising signs for a future recovery of



the oyster populations in these areas. The juvenile oysters dredged at Portsmouth and Langstone Harbours are responsible for the reduced average lengths in these management areas (Figure 3.7.1).

Ryde Middle has historically always had the most abundant and large oysters; however, in 2018 Ryde Middle and Portsmouth Harbour were the only beds opened for oyster fishing. This may explain why the larger individuals in the population were removed, therefore reducing the average length of these management areas, East Solent and Portsmouth Harbour (Figure 3.7.1).

Overall, the survey was accurate and allows a fair comparison between beds and management areas in most situations; however, not in all instances. Three beds in the North Solent management area previously surveyed in past years, could not be surveyed due to the IFA 2 cable works exclusion zone (ABP Southampton, 2019), therefore, skewing the average lengths and CPUE of the North Solent management area and preventing a fair comparison interannually. Furthermore, Southampton Water in general is not too accurate due to the smaller sample sizes at each bed within the management area. The sample sizes are smaller due to restricted space within Southampton Water, therefore increasing variability and decreasing accuracy.

Other species of interest that were dredged included the pacific oyster and king scallop. The pacific oysters, an invasive species, were mostly found in Portsmouth and Langstone harbours, whilst the king scallops were located mostly at Osbourne Bay. Further

information about the king scallop and pacific oyster data collected has been retained and will not be featured in this report.

In the future, the stock assessment will hopefully move from using CPUE to a biological assessment that measures density. However, presently dredge efficiency is so inaccurate with predictions ranging from 2 to 35%, such an assessment cannot be utilised without serious risk of skewing the data.

## References

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[Accessed 18 Sep. 2019].

## 5. Annex

Bivalve Management Area	Bed ID	Native Oyster				CPUE (kg/m/hr/>70mm)	Percentage of positive tows (%)
		Total Number	Smallest (mm)	Largest (mm)	Average (mm)		
Portsmouth Harbour	Bomb Ketch	8	30	74	60.14	3.63	66.67
	Fareham	24	51	87	68.14	4.18	62.50
	Portchester	4	91	107	100.75	4.32	16.67
	Total	36	30	107	76.34	4.04	47.06
Langstone Harbour	Langstone	29	29	116	74.70	3.84	33.33
	Total	29	29	116	74.70	3.84	33.33
West Solent	Newtown	3	70	109	86.75	0.94	16.67
	Pennington	0	N/A	N/A	N/A	0.00	0.00
	Sowley	1	124	124	124.00	1.50	11.11
	Stanswood Bay	1	141	141	141.00	1.15	12.50
	Yarmouth	3	86	110	101.67	2.54	50.00
	Lepe	4	76	89	82.50	1.47	28.57
	Total	12	70	141	107.18	1.27	21.43
East Solent	Osbourne Bay	12	89	140	116.42	3.46	27.27
	Ryde Middle	40	19	122	82.74	6.38	66.67
	Spit Sand	3	79	108	97.00	0.89	20.00
	Sturbridge	8	72	106	89.08	9.98	66.67
	Total	63	19	140	96.31	5.18	41.51
North Solent	Bramble	13	86	110	96.38	4.92	61.54
	Browndown	7	77	114	89.07	5.50	42.86
	Chilling	N/A	N/A	N/A	N/A	N/A	N/A
	Lee-On-Solent	N/A	N/A	N/A	N/A	N/A	N/A
	North Channel	N/A	N/A	N/A	N/A	N/A	N/A
	Stokes Bay	0	N/A	N/A	N/A	0.00	0.00
	Thorn Knoll	1	115	115	115.00	0.53	11.11
	Calshot	0	N/A	N/A	N/A	0.00	0.00
Total	21	77	115	100.15	2.19	41.38	

Southampton Water	Ashlett Creek	7	11	104	84.83	8.58	66.67
	Itchen	3	69	97	77.00	1.88	50.00
	Hamble	10	26	97	72.25	3.58	33.33
	Test	N/A	N/A	N/A	N/A	N/A	N/A
	Weston	2	138	150	144.00	2.15	18.18
	Hythe	1	36	36	36.00	0.00	33.33
	Total	23	11	150	82.82	3.24	33.33
	Grand Total	184.00	11.00	150.00	89.58	3.29	36.34