Sanitary Survey - Review

Langstone Harbour – 2023

Document No. – *J0591/23/06/02*

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Document QA and Approval

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Initial Consultation

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Consultation on draft report

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Portsmouth Port Health Authority	August 2023

A sanitary survey relevant to the bivalve mollusc beds in Langstone Harbour was undertaken in 2013 in accordance with Regulation (EC) 854/2004 (which was replaced by retained EU Law Regulation (EU) 2017/625, with sanitary survey requirements now specified in retained EU Law Regulation (EU) 2019/627). This provided appropriate hygiene classification zoning

and monitoring plan based on the best available information with detailed supporting evidence. In line with regulatory and EU guidance the Food Standards Agency undertake targeted sanitary survey reviews to ensure public health protection measures continue to be appropriate. This report provides a review of information and recommendations for a revised sampling plan if required. Carcinus Ltd. (Carcinus) undertook this work on behalf of the FSA. Carcinus Ltd accepts no liability for any costs, losses or liabilities arising from the reliance upon or use of the contents of this report other than by its client.

Dissemination

Food Standards Agency, Portsmouth Port Health Authority. The report is publicly available via the Carcinus Ltd. website.

Recommended Bibliographic Citation:

Carcinus Ltd., 2023. Review of the Langstone Harbour 2013 Sanitary Survey. Carcinus report on behalf of the Food Standards Agency, to demonstrate compliance with the requirements for classification of bivalve mollusc production areas in England and Wales under retained EU Law Regulation (EU) 2019/627.

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1 Introduction

1.1 Background

The Food Standards Agency (FSA) is responsible for carrying out sanitary surveys in classified production and relay areas in accordance with Article 58 of retained (EU) Regulation 2019/627 and the EU Good Practice Guide (European Commission, 2021). In line with these requirements, sanitary surveys must be reviewed to ensure public health protection measures continue to be appropriate. Carcinus is contracted to undertake reviews on behalf of the FSA.

The report considers changes to bacterial contamination sources (primarily from faecal origin) and the associated loads of the faecal indicator organism *Escherichia coli* (*E. coli*) that may have taken place since the original sanitary survey was undertaken. It does not assess chemical contamination, or the risks associated with biotoxins. The assessment also determines the necessity and extent of a shoreline survey based on the outcome of the desktop report and identified risks. The desktop assessment is completed through analysis and interpretation of publicly available information, in addition to consultation with stakeholders.

1.2 Langstone Harbour Review

This report reviews information and makes recommendations for a revised sampling plan for existing native oyster (*Ostrea edulis*), Pacific oyster (*Crassostrea gigas*) and American hard clam (*Mercenaria mercenaria*) classification zones in Langstone Harbour (Figure 1.1). Data for this review was gathered through a desk-based study and consultation with stakeholders.

An **initial consultation** with Local Authorities (LAs), Inshore Fisheries and Conservation Authorities (IFCAs) and the Environment Agency (EA) responsible for the production area was undertaken in May 2023. This supporting local intelligence is valuable to assist with the review and was incorporated in the assessment process.

Following production of a draft report, a wider **external second round of consultation** with responsible Local Enforcement Authorities (LEAs), Industry and other Local Action Group (LAG) members was undertaken in July and August 2023. It is recognised that dissemination and inclusion of a wider stakeholder group, including local industry, is essential to sense-check findings and strengthen available evidence. The draft report is reviewed taking into account the feedback received.

The review updates the assessment originally conducted in 2013 and sampling plan as necessary and the report should be read in conjunction with the previous survey.

Specifically, this review considers:
(a) Changes to the shellfishery (if any);
(b) Changes in microbiological monitoring results;
(c) Changes in sources of pollution impacting the production area or new evidence relating to the actual or potential impact of sources;

(d) Changes in land use of the area; and

(e) Change in environmental conditions.

Sections 2 - 6 detail the changes that have occurred to the shellfishery, environmental conditions and pollution sources within the catchment since the publication of the original sanitary survey. A summary of the changes is presented in section 7 and recommendations for an updated sampling plan are described in section 8.

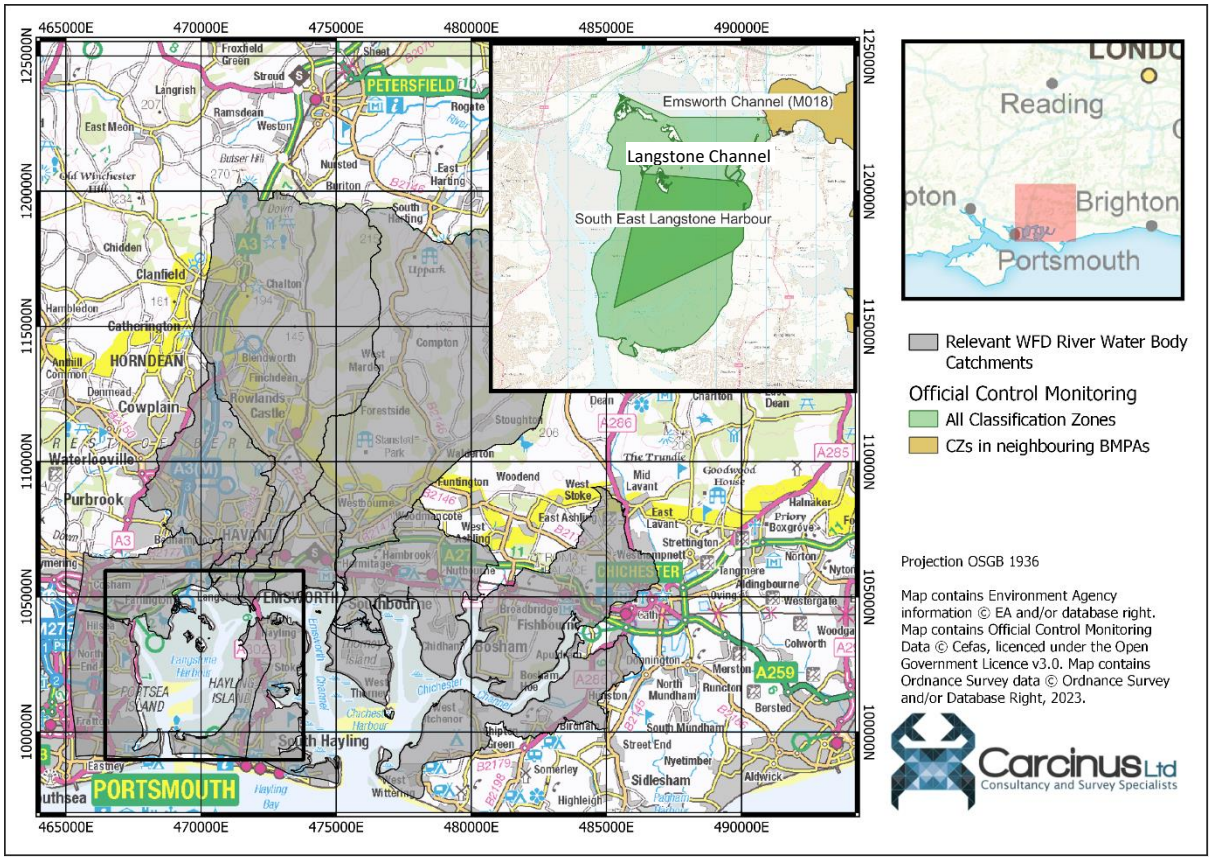


Figure 1.1 Location of Langstone Harbour on the south coast of England. Inset map shows locations of Classification Zones within Langstone Harbour.

1.3 Assumptions and limitations

This desktop assessment is subject to certain limitations and has been made based on several assumptions, namely:

- Accuracy of local intelligence provided by the Local Authorities and Environment Agency
- The findings of this report are based on information and data sources up to and including May 2023;
- Only information that may impact on the microbial contamination was considered for this review; and
- Official Control monitoring data have been provided by Cefas with no additional verification of the data undertaken. The data are also available directly from the data

hub[1]. Results up to and including May 2023 have been used within this study. Any subsequent samples have not been included.

2 Shellfisheries

2.1 Description of Shellfishery

Langstone Harbour is a large natural harbour situated on the south coast of England (see Figure 1.1 black box). A narrow mouth connects the harbour to the Solent, and two smaller channels in the north western and north eastern corners connect it to Portsmouth Harbour (to the west) and Chichester Harbour (to the east). The Solent, Portsmouth Harbour and Chichester Harbour also contain active shellfisheries (Cefas References: M024, M020 and M018 respectively). These areas have all recently been subject to the Sanitary Survey Review process (Carcinus Ltd., 2021b, 2021a, 2022).

The Local Enforcement Authority (LEA) responsible for this fishery in terms of food hygiene Official Control purposes (including sampling) is the Portsmouth Port Health Authority, although it should be noted that other Local Authorities such as Portsmouth City Council and Havant Borough Council have jurisdiction over the land that surrounds the harbour.

During initial consultations, the Southern Inshore Fisheries and Conservation Authority (S-IFCA) reported that Langstone Harbour is a public fishery, but that several byelaws apply to the harvest of shellfish from this area. These are specified within S-IFCA's byelaw booklet (Southern IFCA, 2022), and those relevant to the harvesting of shellfish within Langstone Harbour include:

- The Bottom Towed Fishing Gear Byelaw, which prohibits the use of bottom towed fishing gear within three areas of Langstone Harbour, one in the south east of the Harbour around Sinah Lake and Rod Rithe, one in the north west of the Harbour near the channel connecting Portsmouth and Langstone Harbour, and a smaller area in the north east around South Lake.
- The Oyster Close Season Byelaw, which specifies that no person shall dredge or fish for in or take from any fishery oysters during the period 01 March to 31 October inclusive.
- Oyster Dredges Byelaw, which specifies that no dredge may be used that has a front edge or blade exceeding 1.5 m in length.
- Oysters Byelaw, which specifies that no person shall remove oysters (except Portuguese or Pacific oysters) which will pass through a circular ring of 70 mm internal diameter. Furthermore, no person may remove oyster cultch or spat.
- Prohibition of Gathering (Sea Fisheries Resources) in Seagrass Beds byelaw, which specifies that no person shall take shellfish from designated seagrass areas. Within Langstone Harbour, these are two areas, one in the north west and one in the south east.

[1] Cefas shellfish bacteriological monitoring data hub. Available at: https://www.cefas.co.uk/data-and-publications/shellfish-classification-and-microbiological-monitoring/england-and-wales/.

- Solent Dredge Permit Byelaw, which specifies that no person may dredge for shellfish within the Solent (including Langstone Harbour) without a permit from S-IFCA.

The Solent Dredge Permit and Oysters byelaws cover the entirety of Langstone Harbour. The areas within which the Bottom Towed Fishing Gear and Prohibition of Gathering in Seagrass Beds byelaws apply are shown in Figure 2.1.

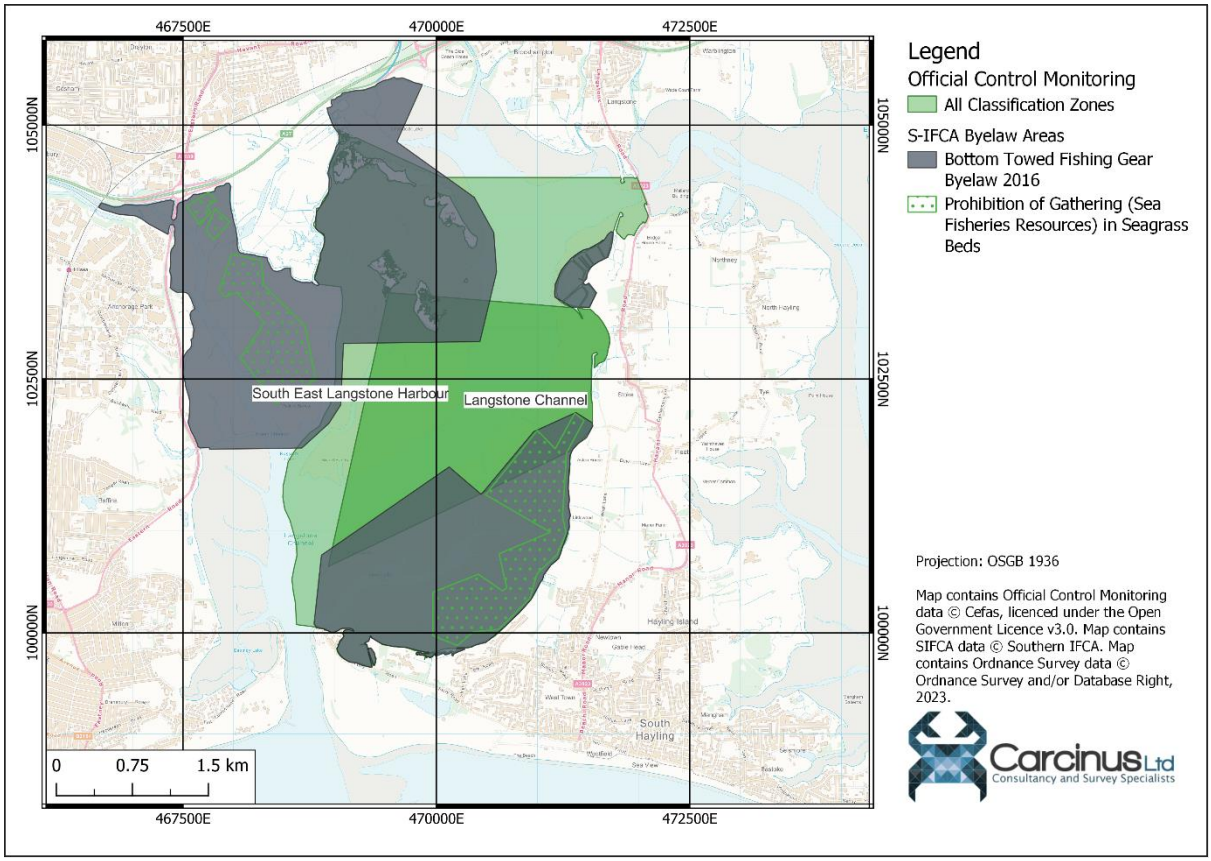


Figure 2.1 Relevant S-IFCA Byelaws within Langstone Harbour.

The 2013 Sanitary Survey made recommendations for the creation of Classification Zones for native oysters, mussels and clams (both *M. mercenaria* and *Tapes* spp. clams). There are currently active classification zones for native oysters, pacific oysters and *M. mercenaria* clams. A summary of the fishery for each species is summarised in the sections below.

2.1.1 Native oysters

The 2013 sanitary survey describes that native oysters were widely distributed throughout the harbour, but restricted to the subtidal channels. Native oyster stocks in shellfisheries across the south coast have been declining in recent years. S-IFCA carries out annual oyster stock assessments in Langstone Harbour, conducting tows in the south eastern corner of the harbour. In the most recent S-IFCA oyster stock assessment, only 12 no. oysters were caught across 14 tows (S-IFCA, 2022). However, 83% of these oysters were above the 70 mm minimum landing size. The S-IFCA threshold for a viable oyster fishery is a Catch Per Unit

Effort (CPUE) of 15 kg/m/hr, during the 2022 survey the CPUE was only 1.1. The terms of the oyster byelaws have not changed since that described in the 2013 sanitary survey.

The 2013 Sanitary Survey made recommendations for the creation of five Classification Zones for native oysters, *Budds Farm*, *Langstone Channel*, *Sinah Lake*, *Broom Channel* and *Salterns*. *Budds Farm* was never awarded a full classification, *Sinah Lake* was most recently classified in 2017 but has been declassified since 2018. *Broom Channel* was most recently classified in 2013 but has been declassified since 2014. *Salterns* has been declassified since 2017. *Langstone Channel* was declassified between 2013 and 2016 but has been classified since then.

The current output of this fishery is 0 kg per annum as stock levels are insufficient to support a viable fishery.

2.1.2 Pacific oysters

No recommendations for Classification Zones for Pacific oysters were made in the 2013 Sanitary Survey. The S-IFCA oyster byelaws do not apply to this species. No stock assessment is available. *Sinah Lake* was considered for classification in 2018 but no full classification was ever awarded. There is currently only one classification zone for this species, *Langstone Channel,* which has been classified since 2018.

During initial consultations, the LEA stated that the estimated landings from the Langstone Harbour fishery were approximately 80 tonnes of shellfish in 2022. It is not clear from the data available what proportion of the total relates to Pacific oysters. S-IFCA also stated that there is some hand-gathering of this species.

2.1.3 *M. mercenaria* clams

S-IFCA states a minimum landing size of 63 mm for this species. The catch data from the 2022 Solent Dredge Permit recordings indicate that approximately 222 kg *M. mercenaria* clams were landed. The report of the 2022 Solent Bivalve survey state that small quantities *M. mercenaria* were recorded during surveys, but does not provide actual catch statistics.

The 2013 Sanitary Survey recommended the creation of four Classification Zones for the *M. mercenaria* clams (these zones also included *Tapes* spp. clams), *Budds Farm*, *South East Langstone Harbour*, *Broom* and *Milton*. Of these, only *South East Langstone Harbour* was awarded a full classification, and has held an active classification since 2013. The current boundaries of this zone are different to that described in the 2013 Sanitary Survey, as they now extend much further north, incorporating approximately 50% of the area of the *Budds Farm* CZ. It is not clear from the information provided during consultations when this boundary change occurred.

During initial consultations, the LEA stated that the estimated landings from the Langstone Harbour fishery were approximately 80 tonnes of shellfish in 2022. It is not clear from the data available what proportion of the total comes from *M. mercenaria* clams.

2.1.4 Other Species

During initial consultations, S-IFCA stated that manila clams (*Tapes* spp.) and cockles (*Cerastoderma edule*) were harvested from within Langstone Harbour. 610 kg of manila clams were landed in 2022. A combined 950 kg of cockles and scallops *Pecten maximumus* were landed, but it is not clear what proportion is made up of which species. The 2013 Sanitary Survey recommended that the *M. mercenaria* CZs should also apply to *Tapes* spp., but at the time of writing (June 2023), there are no active Classification Zones for this species. During secondary consultation, S-IFCA confirmed that no additional information on the locations of this fishing activity could be provided. Fishers are only required to state which Bivalve Management Area (BMA) the shellfish are caught in, and 'Langstone Harbour' is managed as a singular BMA so no more fine-scale assessment of harvesting areas is possible.

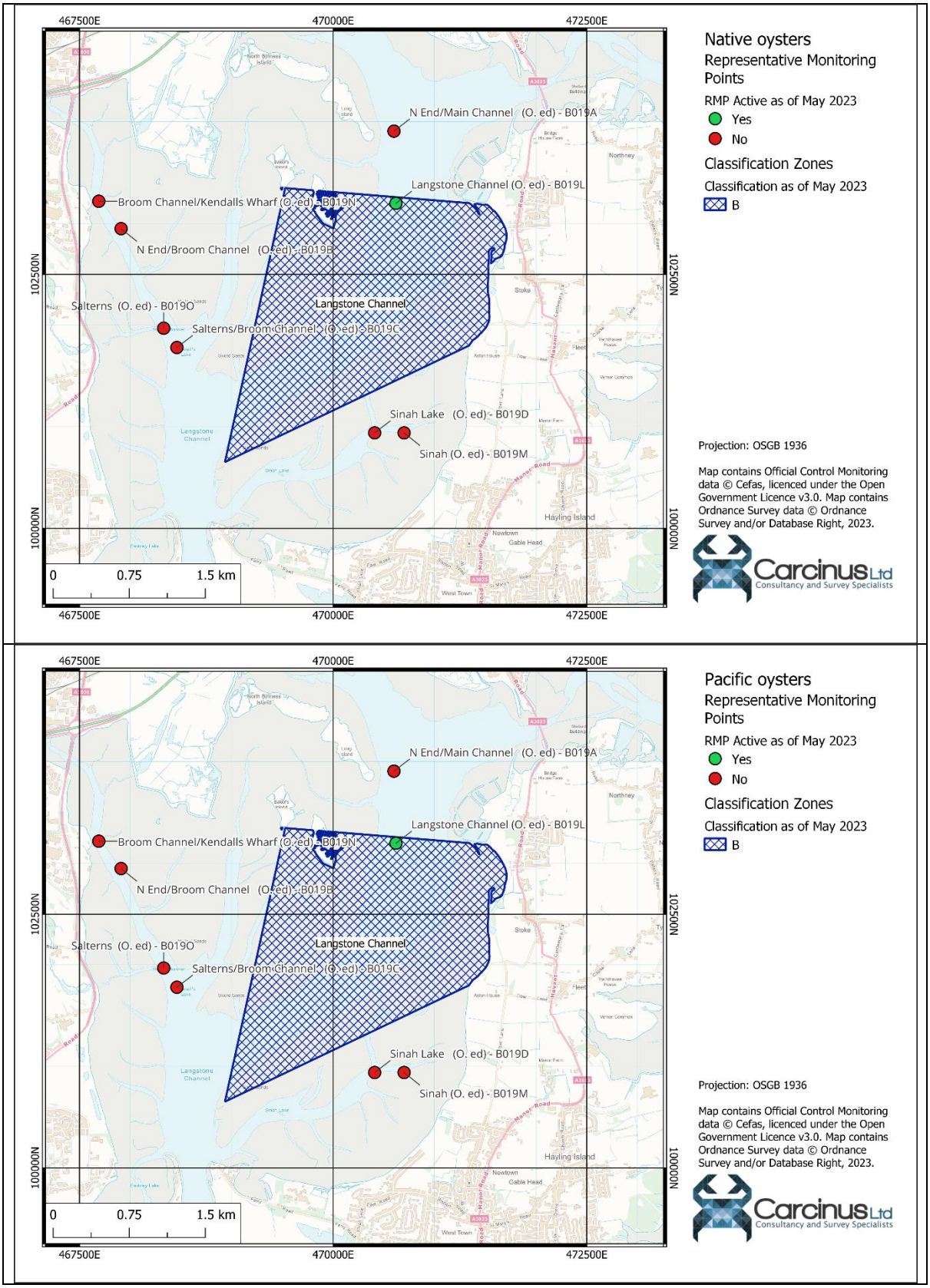
There is an active fishery for King Scallops *Pecten maximus,* but this species does not require consideration in this Sanitary Survey Review. Unlike most other live bivalve mollusc (LBM) species, there is regulatory flexibility around scallops' classification. Retained EU Law Regulation 2019/627 sets out specific rules for the Official Control of these species when specific production or relaying areas are not classified.

2.2 Classification History

The 2013 Sanitary Survey recommended that the entirety of Langstone Harbour be classified for the harvest of native oysters and clams (*M. mercenaria* and *Tapes* spp.), with five and four separate CZs respectively. It also recommended the creation of one small CZ in the western harbour for mussels. There are currently three CZs in the harbour, one for native oysters, one for Pacific oysters, and one which is classified for *M. mercenaria* clams. The location and classification status of all active CZs, along with all RMPs sampled in the area since 2010, are presented in Table 2.1 and Figure 2.2.

Table 2.1 Summary of all currently active classification zones in the Langstone Harbour BMPA.

Classification Zone	Species	Current Classification (as of May 2023)
Langstone Channel	Native oyster	B
	Pacific oyster	B
South East Langstone Harbour	*M. mercenaria*	B-LT


467500E
470000E
472500E
102500N
100000N
N End/Main Channel (O. ed) - B019A
Langstone Channel (O. ed) - B019L
Broom Channel/Kendalls Wharf (O. ed) - B019N
N End/Broom Channel (O. ed) - B019B
Salterns (O. ed) - B019O
Langstone Channel
Salterns/Broom Channel (O. ed) - B019C
Sinah Lake (O. ed) - B019D
Sinah (O. ed) - B019M
Hayling Island
0
0.75
1.5 km
Native oysters
Representative Monitoring Points
RMP Active as of May 2023
Yes
No
Classification Zones
Classification as of May 2023
B
Projection: OSGB 1936
Map contains Official Control Monitoring data © Cefas, licenced under the Open Government Licence v3.0. Map contains Ordnance Survey data © Ordnance Survey and/or Database Right, 2023.
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Pacific oysters
Representative Monitoring Points
RMP Active as of May 2023
Yes
No
Classification Zones
Classification as of May 2023
B
Projection: OSGB 1936
Map contains Official Control Monitoring data © Cefas, licenced under the Open Government Licence v3.0. Map contains Ordnance Survey data © Ordnance Survey and/or Database Right, 2023.
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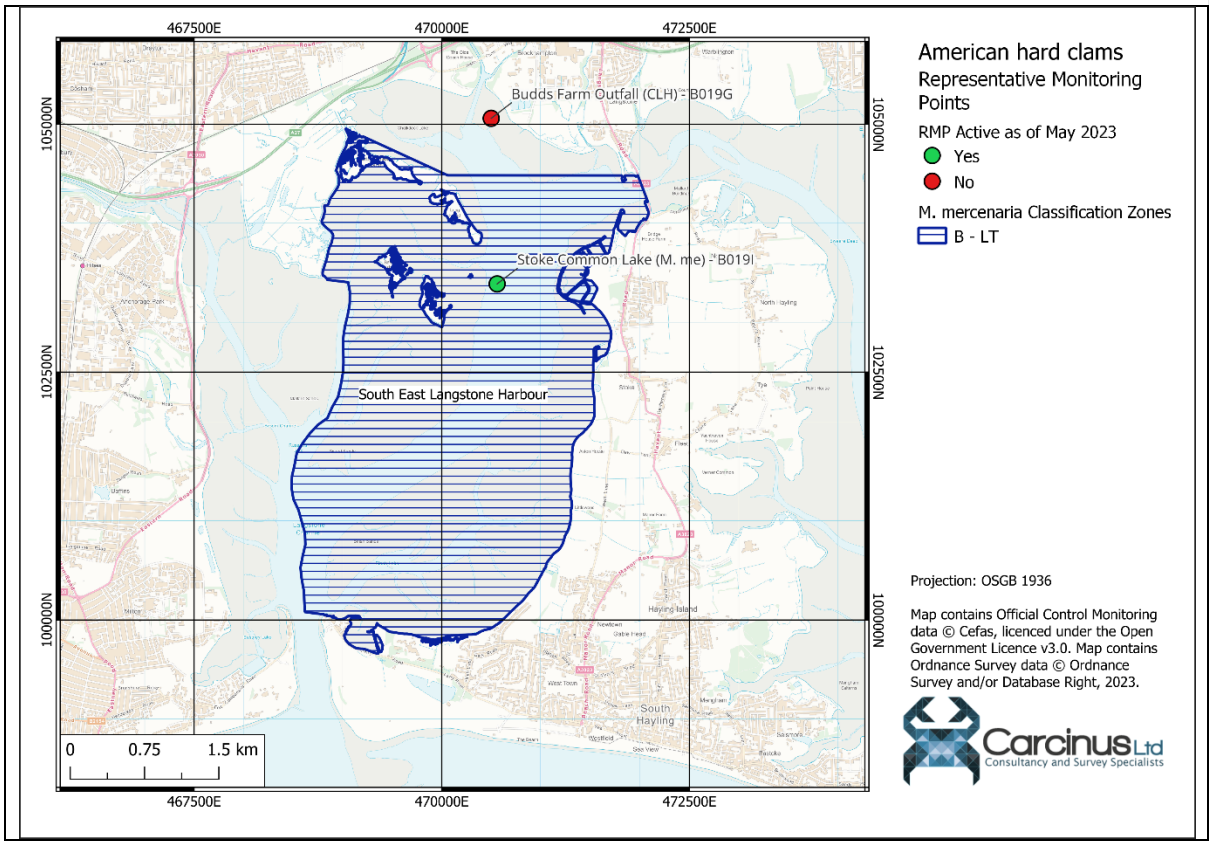

Figure 2.2 Current classification Zones and associated RMPs for the currently active CZs in the Langstone Harbour BMPA.

3 Pollution sources

3.1 Human Population

The original sanitary survey, published in 2013, cites population data for the catchment based on the 2001 Census, and notes that the 2011 Census were not yet available. However, as the 2011 Census is more relevant to the distribution of human population in the catchment at the time of publication of the original sanitary survey, the results of that Census have been compared to that of the 2021 Census to give an indication of population trends across the catchment in the last 10 years. Changes in human population density within Census Super Output Areas (lower layer) in the Langstone Harbour catchment at the 2011 and 2021 Censuses are presented in Figure 3.1.

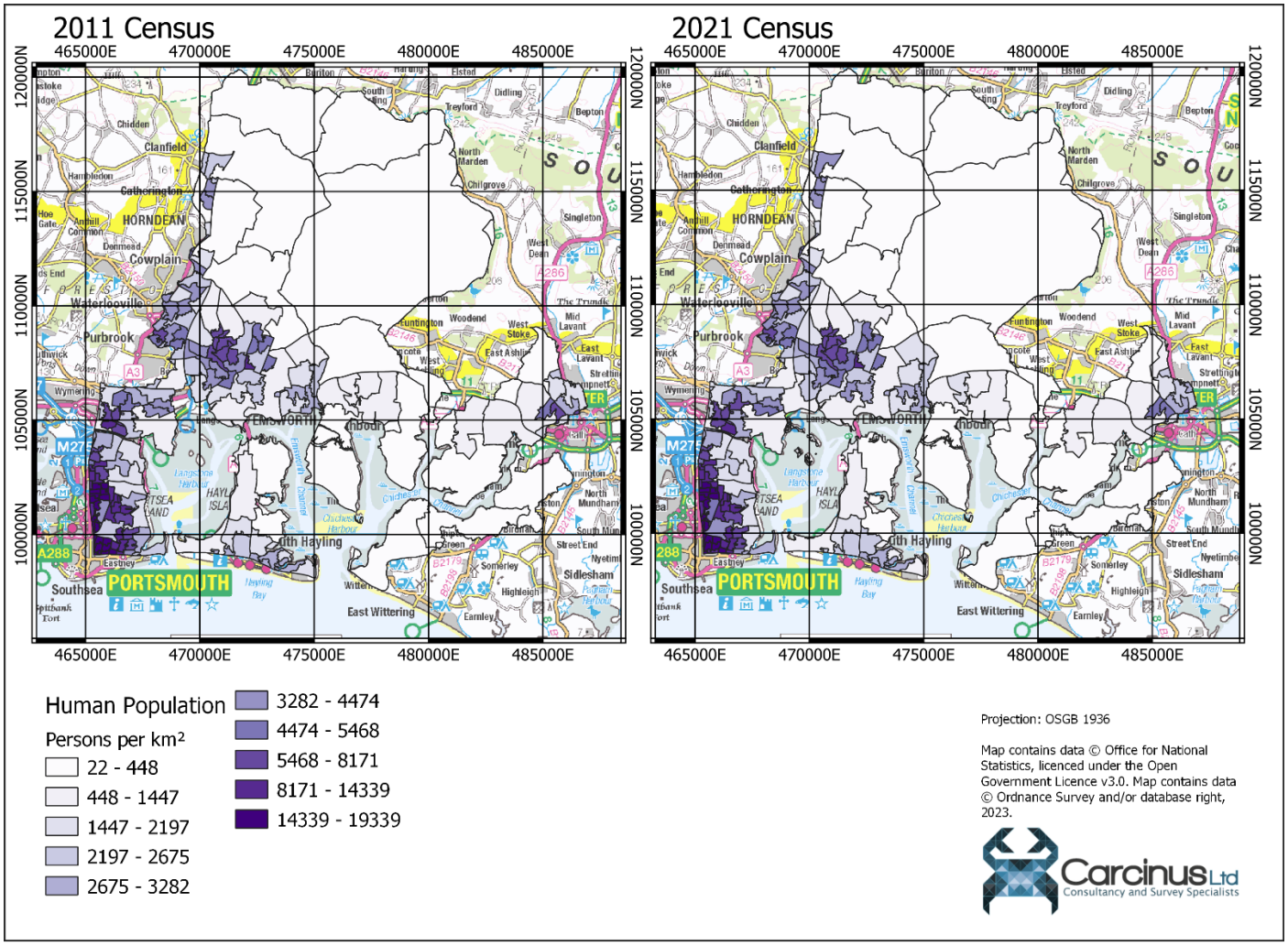

Figure 3.1 Human population density in Census Super Output Areas (lower layer) wholly or partially contained within the Langstone Harbour catchment at the 2011 and 2021 Censuses.

The maps presented in Figure 3.1 indicate patterns of population density across the catchment have remained consistent between 2011 and 2021. Highest population densities continue to be the city of Portsmouth in the west of the catchment, as well as Waterlooville and Havant to the north of the Harbour. Outside of these conurbations population densities are much lower. None of the Census Output Areas (lower layer) immediately adjacent to the Harbour have population densities above 1,000 people per square kilometre. At the 2011 Census, the population in the catchment was approximately 296,412 people. By the 2021 Census, this had increased to 344,691 (an increase of approximately 16%). The greatest potential for urban runoff comes from the town of Havant in the north of the harbour, and the city of Portsmouth to the west. The Environment Agency's Shellfish Water Action Plan for Langstone Harbour classifies the risk of diffuse urban contamination as being 'medium'[2].

During initial consultations, the LEA did not advise of any significant housing developments in the vicinity of Langstone Harbour since the 2013 Sanitary Survey was published. The interactive mapping service published by Havant Borough Council[3] indicates that no areas immediately adjacent to the Harbour have been identified as prime sites for housing development. The Local Plans for the area state that development proposals in currently undeveloped areas of coast will not usually be permitted, meaning that it is considered unlikely that the level of urban run-off will increase in the future. The risk of this source of pollution is also not considered to have increased significantly since the 2013 Sanitary Survey was published.

The 2013 Sanitary Survey provides tourism statistics from the mid 1990's noting that the area receives a significant seasonal influx of visitors during summer months. In 2015, the number of day visitors to Havant was 2.7 million (Havant Borough Council, 2015), an increase of 4% on 2012 numbers. No more recent tourism statistics are available, but it considered likely that summer months continue to see a significant number of tourists to the region. Any increase in tourist numbers will see an increase in the volumes of sewage received by sewage treatment works in the area. During initial consultations, the EA stated that there are some concerns over additional spills from intermittent discharges when population numbers are higher than normal, although it is thought that rainfall levels are a more significant driver of this source of contamination. Full details of changes to the wastewater treatment network in the area is discussed in the next section.

Analysis of the 2021 Census suggests that there are currently just over 344,000 people in the catchment, mainly concentrated in the city of Portsmouth and the town of Havant. Comparison with the data from the 2011 Census shows that the distribution of these population centres has not changed. It is also likely that the area continues to receive a significant number of tourists each year, which will cause additional loading to the

[2] Medium contribution: estimated to account for 10% - 39% of contamination affecting a particular shellfish water.

[3] 'My Maps' Service, Havant Borough Council. Available at: http://maps.havant.gov.uk/havant.aspx.

wastewater treatment network. Overall, the recommendations made in the 2013 Sanitary Survey to account for the impact of human populations remains valid.

3.2 Sewage

Details of all consented discharges in the vicinity of Langstone Harbour were taken from the most recent update to the Environment Agency's national permit database at the time of writing (June 2023). The locations of these discharges within the BMPA and near the classification zones are shown in Figure 3.2.

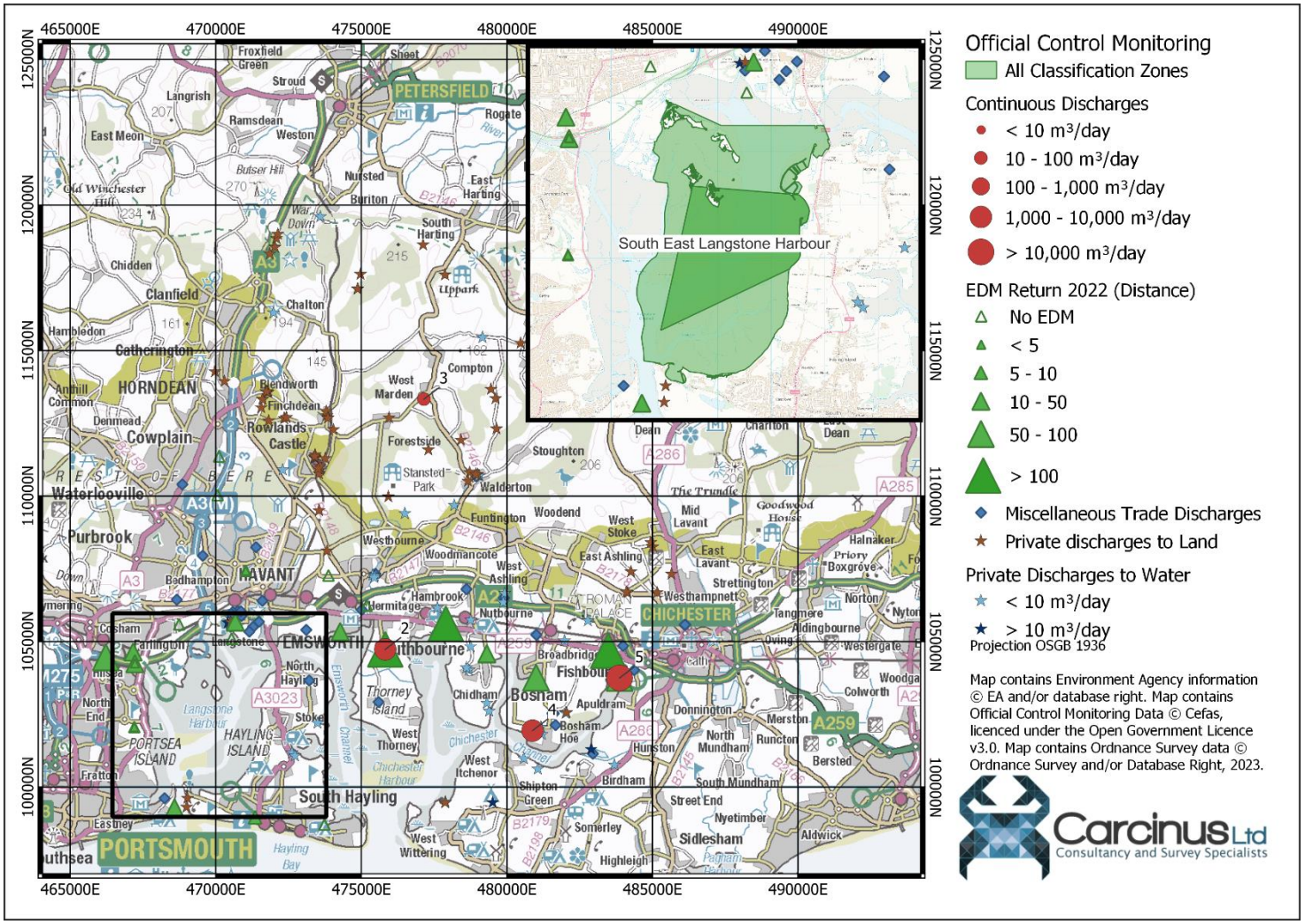

Figure 3.2 Locations of all consented discharges in the vicinity of the Langstone Harbour catchment. Labels refer to continuous discharges, details of which are presented in Table 3.1.Budds Farm STW is not visible as the outfall is located 5 km from the mouth of Langstone Harbour.

Table 3.1 Details of all continuous discharges in the vicinity of the Langstone Harbour BMPA.

ID	Discharge	Permit Number	Receiving Water	Outlet NGR	Treatment	Dry Weather Flow (m^3/day)	Distance (km) to centre of nearest CZ
1	BUDDS FARM WWTW	A00751	THE SOLENT/LANGSTONE HARBOUR	SZ6679093250	BIOLOGICAL FILTRATION	108,853	9.2
2	THORNHAM WWTW	W00354	CHICHESTER HBR VIA LITTLE DEEP	SU7582004730	BIOLOGICAL FILTRATION	6,565	6.04
3	WEST MARDEN WWTW	W00330	GW VIA INFILTRATION SYSTEM	SU7715013330	BIOLOGICAL FILTRATION	40	12.98
4	BOSHAM WWTW	W00133	CHICHESTER HARBOUR CHANNEL	SU8088001940	UV DISINFECTION	1,221	10.60
5	CHICHESTER WWTW	W00137	CHICHESTER HARBOUR	SU8387003750	UV DISINFECTION	13,524	13.66

The 2013 Sanitary Survey identified only one continuous water company discharge in the Langstone Harbour catchment, West Marden Sewage Treatment Works (STW) (ID 3). It notes that the treated effluent from Budds Farm STW (ID 1) (the major works serving Portsmouth and Havant) was re-routed to a long-sea outfall 5 km south of the entrance to Langstone Harbour in 2001. The treatment methodology and consented discharge volume from these discharges has not changed since the 2013 sanitary survey was published. West Marden STW has a consented discharge volume of only 40 m^3/day. The Shellfish Action Plan for this shellfishery, published by the Environment Agency states that there are no continuous discharges that discharge directly to this shellfish water. Discharges from continuous water company owned discharges are therefore considered to have very little direct impact on the bacteriological health of the BMPA, and no update to the sampling plan is necessary on this basis.

In addition to the water company owned continuous discharges, the 2013 Sanitary Survey identified a total of 14 intermittent discharges. Intermittent discharges comprise Combined Storm Overflows (CSOs), Storm Tank Overflows (STOs) and Pumping Station Emergency Overflows (PSs). During AMP6 and AMP7, Event Duration Monitoring (EDM) was installed at several of the discharges within the catchment. Summary data for 2020, 2021 and 2022 was published by the Environment Agency in March 2021, March 2022 and March 2023 respectively (Environment Agency, 2022). Details of this EDM return for intermittent discharges in the vicinity of Langstone Harbour for 2022 are presented in Appendix I.

Only four of the intermittent discharges identified in the 2013 Sanitary Survey had EDM capability fitted. These were the Mainland (Drayton) PS (36 spills between 2005 – 2011), Fort Cumberland (95 spills), Cosham Court Lane (128 spills) and Budds Farm (345 spills). The 2013 Sanitary Survey does not provide an annual summary of the number of spill events from these discharges to facilitate a direct comparison, but Budds Farm continues to be the most active discharge in the Langstone Harbour (52 spills for 647 hrs in 2022). Under dry weather conditions treated effluent is discharged via the continuous discharge, Budds Farm STW long-sea outfall, however, in wet weather when the flow in the sewers exceeds a certain threshold, discharges are permitted through various CSOs in the sewer catchment such as Fort Cumberland CSO (at the harbour entrance) and Budds Farm SSO. During initial consultations, the EA advised that improvements were made to the Fort Cumberland CSO in 2014 to increase storage and improve screening. Similar improvements were also made to Budds Farm and Mainland Drayton WPS in 2016. For AMP8 (2025 – 2030) additional improvements to the Budds Farm and Court Lane Cosham CSO to reduce the frequency of spills are planned, which should reduce the impact of these discharges on the bacteriological health of the shellfishery. Consideration should be given to the location of any intermittent discharges near shellfish beds as they have been identified within this report and initial consultation responses as a significant source of microbiological contamination to this BMPA. Flows from the Budds Farm SSO will impact the northern part of the *South East Langstone Harbour* CZ, and flows from the Fort Cumberland SSO will impact the southern part of the same zone. The *Langstone Channel CZ* will be impacted to a

lesser degree than the *South East Langstone Harbour* CZ, as its boundaries do not extend as close to the intermittent discharge locations.

In addition to the water company owned discharges, there continue to be a number of privately owned discharges within the catchment, serving properties that are not connected to the main sewerage network. Most of these are in the upper reaches of the catchment and will not have any impact on the bacteriological water quality of the Langstone Harbour BMPA due to the distance (and therefore dilution/die off potential) between the outfall locations and the CZs. The Shellfish Water Action Plan states that these are not considered to be a significant source of pollution at present, and the findings of this desktop assessment support this.

This review has found that the main risk of microbiological contamination from sewage discharges within Langstone Harbour continues to come from water company owned intermittent discharges. The main continuous discharge in the catchment discharges to a long sea outfall 5 km from the mouth of Langstone Harbour, and most of the privately owned discharges are small. Improvement works to the intermittent discharges are planned for coming years, but consideration should still be given to the presence of intermittent discharges in any updated sampling plan.

3.3 Agricultural Sources

The 2013 Sanitary Survey cites livestock population data for the Langstone Harbour and Emsworth Channel catchment areas based on the 2010 Livestock Census. Data at the same spatial resolution was not freely available to the authors of this review, and so a data request was made to the Farming Statistics Office for the Department for Environment, Food and Rural Affairs (DEFRA) for livestock populations within the catchment presented in Figure 1.1 for 2013 and 2021, the next two census years. Figure 3.3 presents the changes in livestock populations within the Langstone Harbour catchment between 2013 and 2021, based on the June Survey of Agriculture and Horticulture[4]. Data on pig populations were suppressed to prevent disclosure about individual holdings, although in practice this suggests that populations are very small and unlikely to pose a significant contamination risk to the shellfish production area.

[4] June Survey of Agriculture and Horticulture. Further information available at: https://www.gov.uk/guidance/structure-of-the-agricultural-industry-survey-notes-and-guidance#june-survey-of-agriculture-and-horticulture-in-england.

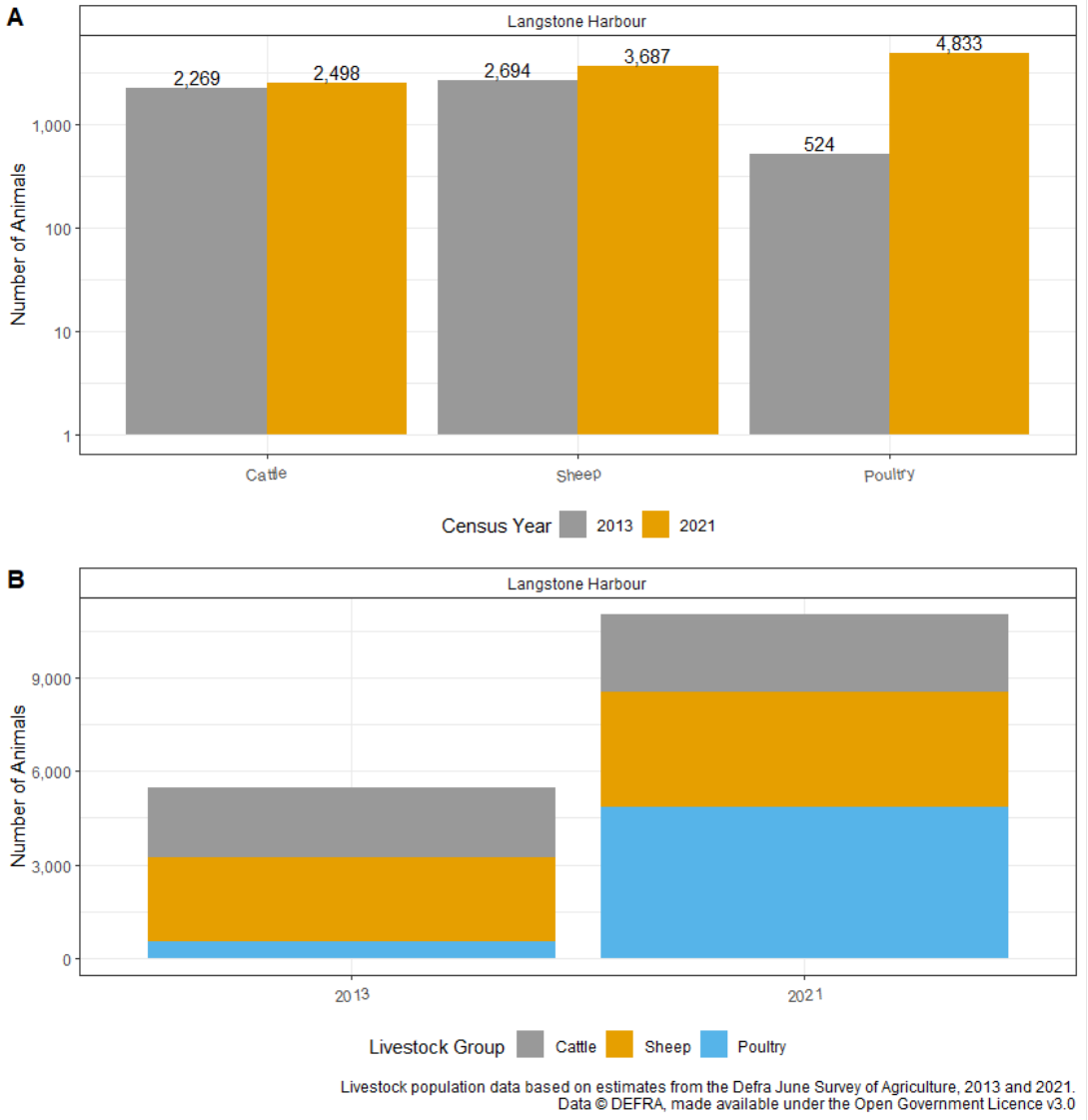

Figure 3.3 Changes in livestock populations within the Langstone Harbour catchment. Panel A shows populations broken down by different livestock groups and panel B shows the aggregated population.

The data presented above shows that livestock populations across all groups increased between 2013 and 2021, but the most notable increase was in poultry, where the population increased from just over 500 to 4,823. This data is suggestive of the development of a new poultry farm, but no information on this was available to the authors of the review at the time of writing (August 2023). It should be noted that the June Survey represents a snapshot of livestock populations in a single day, but populations will vary throughout the year. Highest numbers of animals will occur in spring, following the birthing season, and the lowest in autumn and winter when animals are sent to market.

The principal route of contamination of coastal waters by livestock is surface runoff carrying faecal matter. The change in land cover of the Langstone Harbour catchment between 2012 and 2018 is shown in Figure 3.4. This figure confirms the findings of Section 3.1, in that the

main built-up areas of the catchment are the town of Havant in the north of the Harbour, and the city of Portsmouth to the west. Figure 3.4 also shows that whilst there is a great deal of agricultural land in the catchment, much less is reserved for pasture. The 2013 Sanitary Survey describes that there were some areas of pasture immediately adjacent to the harbour. Land cover maps confirm that this pasture is still present. Pasture areas adjacent to shorelines represent the greatest contamination risk to the classification zones. This is due to run-off from the land travelling less distance before reaching the CZs, resulting in less dilution and *E. coli* die off. Run-off from rivers further up the catchment will have a lower risk of contamination to the CZs, because the increased distance will result in further dilution and *E. coli* die off. These may however contribute to background levels of contamination in the CZs.

Arable farmland can also represent a risk to the bacteriological health of a shellfishery, particularly where slurry is applied to fields. The spreading of slurry to fields is controlled under the Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018, known as the Farming Rules for Water, which came into force in April 2018. This legislation lays out a set of rules that require good farming practice, so that farmers manage their land both to avoid water pollution and benefit their business. Rules include requiring farmers to judge when it is best to apply fertilisers, where to store manures and how to avoid pollution from soil erosion. Furthermore, silage and slurry storage for agricultural purposes is subject to The Water Resources (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 (SSAFO). All farmers must comply with the SSAFO regulations when building new slurry stores, or substantially altering (e.g., enlarging) existing ones. All stores must be built at least 10 m from any watercourse, including field drains or ditches, and be built or altered to last for at least 20 years with proper maintenance. Since 2021, the EA now has ART (Agricultural Regulatory Taskforce) Officers that have all been assigned a catchment and will engage, inspect, advise and if necessary, enforce the Silage, Slurry and Agricultural Fuel Oil regulations and the new (2018) Farming Rules for Water. During initial consultations, the EA confirmed that there are no specific local byelaws that relate to slurry activity, but most farms in the area are acting under a Countryside or Environmental Stewardship scheme. In theory, these legislative changes should have reduced the pollution that this activity causes to shellfish beds.

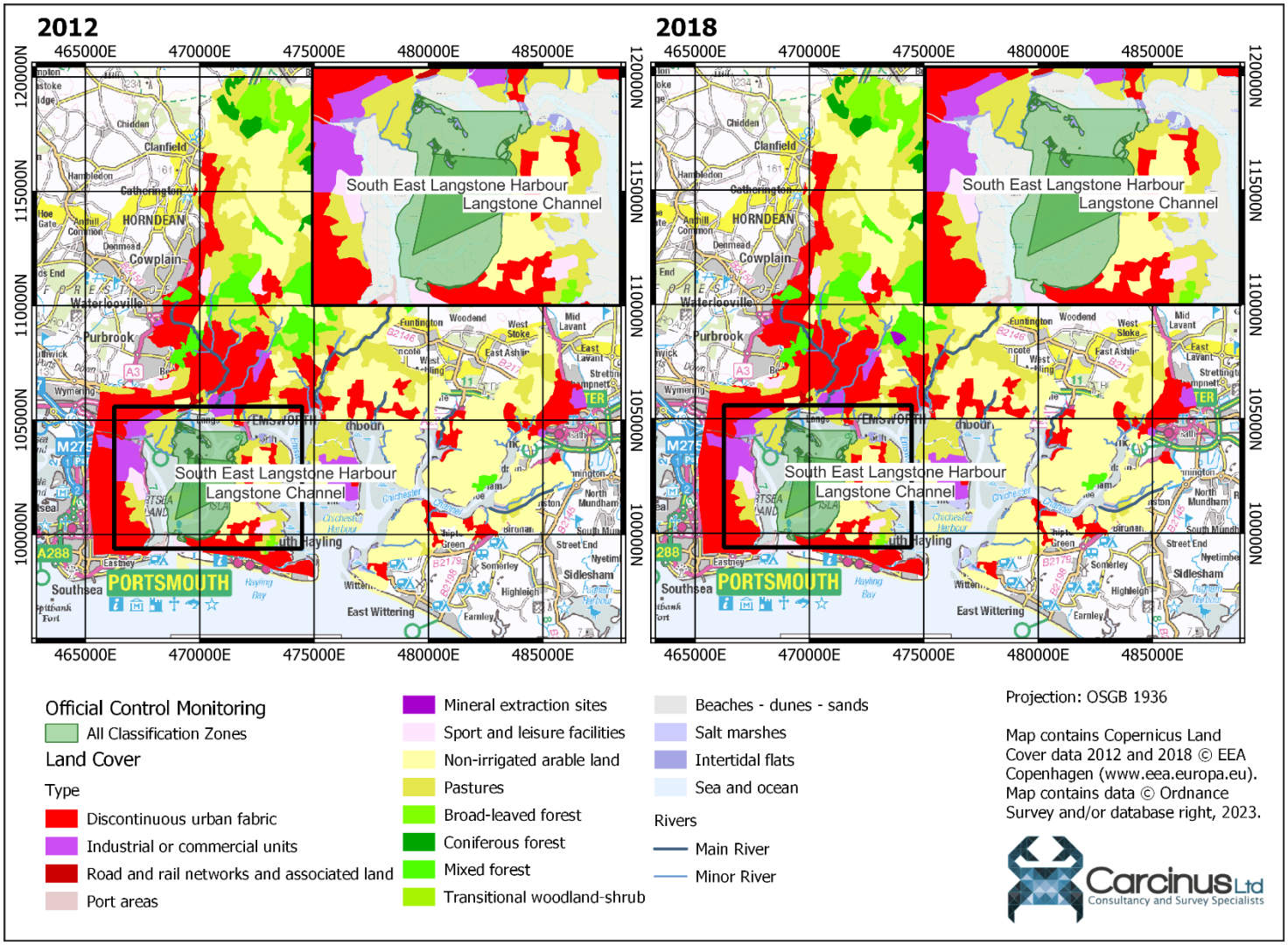

Figure 3.4 Land cover change between 2012 and 2018 for the Langstone Harbour Catchment.

The Shellfish Water Action Plan for Langstone Harbour states that the impact of agricultural runoff in this area is 'low'[5]. This desktop assessment supports this conclusion due to the small livestock populations in the catchment and the fact that there are very few areas of arable farmland located adjacent to the waters of the harbour. The recommendations made in the original sanitary survey to account for this source of contamination remain valid.

3.4 Wildlife

Langstone Harbour contains a variety of intertidal and subtidal habitats that support a significant diversity of wildlife. The 2013 Sanitary Survey identifies that the most significant wildlife aggregation in terms of its impact on shellfish hygiene was overwintering waterbirds (waders and wildfowl). This group are important to the bacteriological health of a BMPA given that they frequently forage (and therefore defecate) directly on intertidal shellfish beds.

Figure 3.5 shows the temporal trend in total overwintering waterbird counts from the winter of 2002/2003 – 2021/2022 (the most recent for which data are available). It shows that the most dominant group have been waders and wildfowl, and that the total populations are lower than at the time of the 2013 Sanitary Survey. The average total count of waterbirds in the five winters to 2012/2013 was 28,897, but in the five winters to 2021/2022, the average count had fallen to 25,113 (a decrease of 13.09%). The harbour does still contain internationally significant populations of Brent Goose and nationally significant populations of several others, including dunlin.

[5] Low contribution: estimated to account for <10 % of contamination affecting a particular shellfish water.

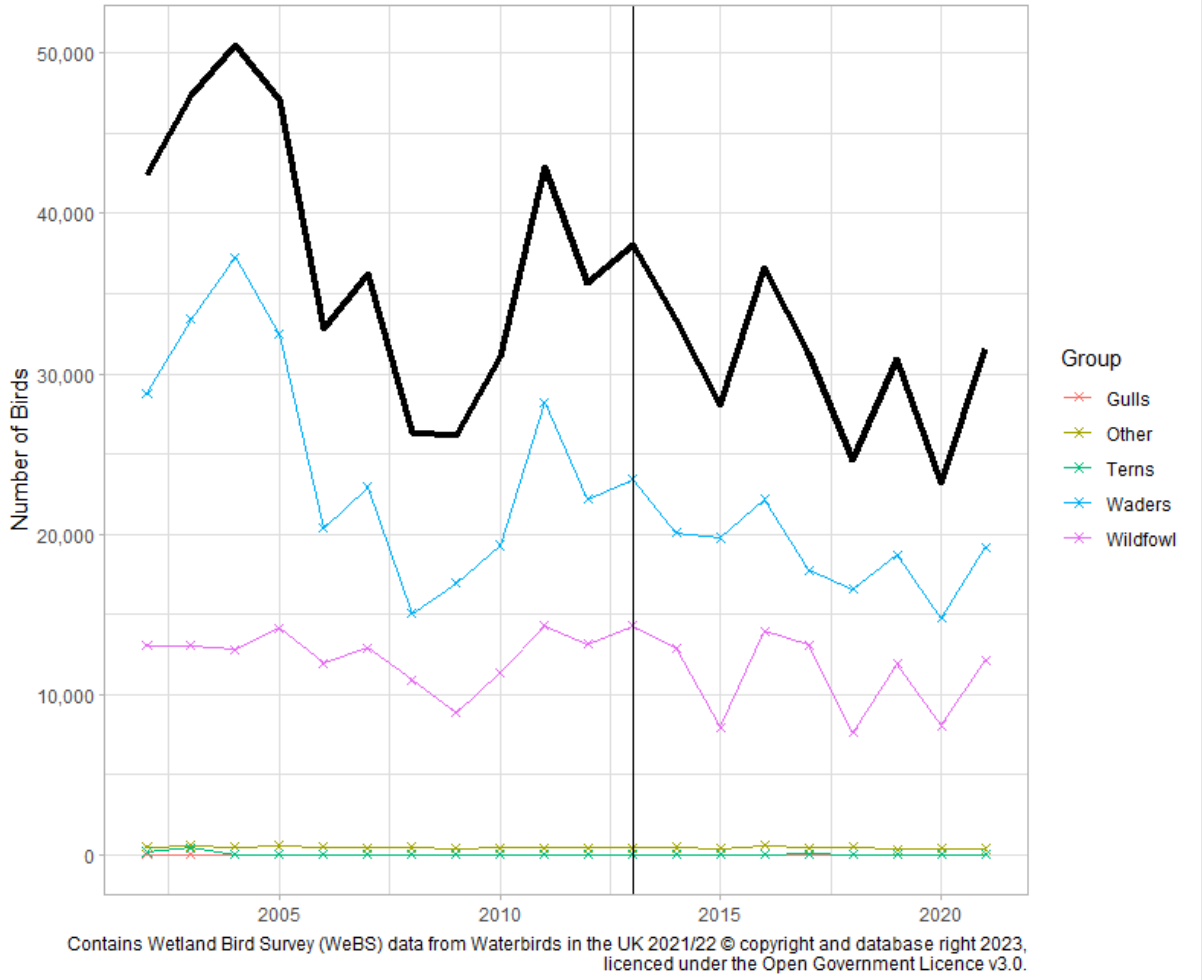

Figure 3.5 Temporal trend in waterbird counts in Langstone Harbour. Solid black line is the total of all groups combined. Data from the Wetland Bird Survey (Austin et al.*, 2023).*

The largest aggregations of waterbirds, and therefore the highest risk of contamination, will occur in winter months. The distribution of waterbirds within the estuary will be driven by the aggregations of their foraging resource, which will shift from year to year. As a consequence, it is challenging to define RMPs which reliably capture this source of pollution. This situation has not changed since the original sanitary survey was published.

There is a small population of harbour seals (*Phoca vitulina*) in the wider Solent, with haul out sites in the neighbouring Chichester Harbour (Thompson *et al.*, 2019). These animals show wide foraging ranges and may contaminate the shellfishery from time to time, although the spatial and temporal variability in their distribution makes it impossible to account for the potential contamination their faeces would cause in any updated sampling plan.

The Shellfish Action Plan for this waterbody classifies animal/bird contamination as being of 'medium' contribution to overall levels of contamination in the shellfishery. Waterbird populations are the main wildlife group likely to contribute significant amounts of bacteriological contamination to the BMPA, although it remains challenging to account for

the pollution from wildlife in any updated sampling plan, due to the spatial and temporal variability of the pollution source. Some minor impacts from seals may occur, but again it is not possible to reliably account for this in any updated sampling plan.

3.5 Boats and Marinas

The discharge of sewage from boats is a potentially significant source of contamination to the shellfish beds within the BMPA. Boating activities in the area have been derived through analysis of satellite imagery and various internet sources, and compared to that described in the 2013 Sanitary Survey. Their geographical positions are presented in Figure 3.6.

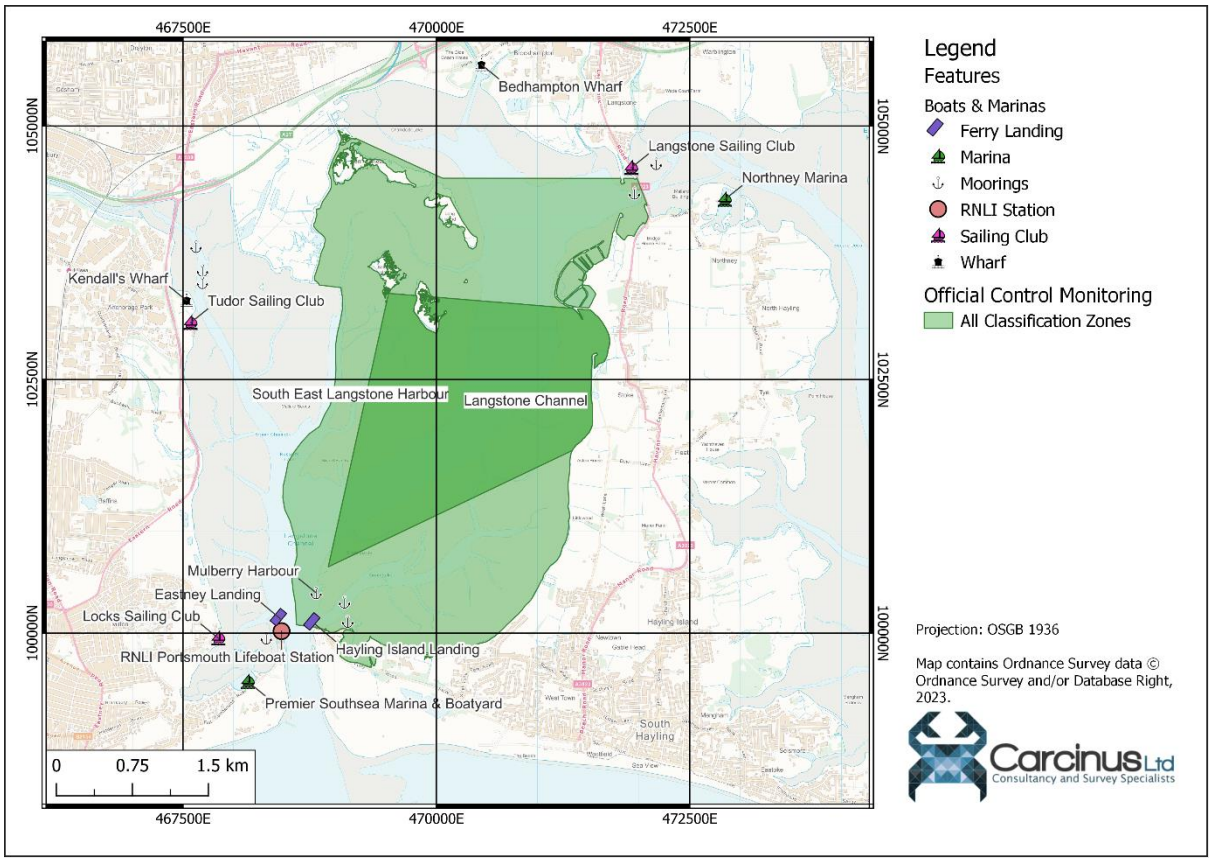

Figure 3.6 Locations of boats, marinas and other boating activities in the vicinity of Langstone Harbour.

The 2013 Sanitary Survey describes that Langstone Harbour contained two wharves capable of receiving merchant shipping traffic. Both Kendall's Wharf in the west of the Harbour and Bedhampton Wharf in the north the harbour are capable of receiving vessels up to 80 m LOA (Langstone Harbour Board, 2023). The legislation[6] governing the overboard discharge from merchant shipping has not changed, and so there is considered to be no risk to shellfish CZs from this source of contamination.

A small fishing fleet lists Langstone Harbour as its home port, with four vessels under 10 m and two over 10 m (gov.uk, 2023). This is a smaller number of boats than reported in the

[6] The Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations 2008.

2013 Sanitary Survey, and as a consequence it is not considered to be a significant source of contamination to the shellfish CZs.

During initial consultations, the authors of this review were advised that whilst there are no marinas within the main part of Langstone Harbour, there are several areas of swinging moorings and sailing within the subtidal areas of the Harbour is common. There is a marina near the mouth of Harbour, Southsea Marina, which has 300 berths and provides pump out facilities (Premier Marinas, 2023). Vessels of a sufficient size to contain on board toilets may make overboard discharges from time to time, particularly when moving through the main navigational channels or moored overnight away from the main marina. The main area at risk of this source of contamination are likely to be the areas of swing moorings in the far south and far north of the *South East Langstone Harbour* CZ. No moorings are present within the *Langstone Channel* CZ area. The greatest risk of this source of contamination will occur in the summer months, when vessel usage is at its highest.

Comparison with the situation described in the 2013 Sanitary Survey suggests that overall, the level of recreational boating activity in the area remains high, and there is a chance that the main navigational channels and areas of moorings will receive some contamination, particularly in the summer. However, the recommendations made in the 2013 report remain valid as the areas at risk have not changed.

3.6 Other Sources of Contamination

Utility misconnections are when foul water pipes are wrongly connected and enter surface waters without treatment, potentially putting raw sewage directly into watercourses via surface water drains. During initial consultations, the EA advised investigations by this organisation into faecal contamination in the Hermitage Stream, which drains to the north of the Harbour, through the town of Havant showed the stream was often highly contaminated. Investigations are complete, however the full report was unable to be shared with the authors of this review at the time of writing (June 2023).To date two misconnections have been remedied. Utility misconnections are therefore a potentially significant contaminating influence on this BMPA. This contamination will generally originate via the main watercourses draining to the Harbour, the Hermitage Stream in the north and the river Lavant in the north west. As such, it will affect the bacteriological water quality of the northern reaches of Classification Zones to a greater degree than southern parts and this should be taken into consideration in the updated sampling plan.

Some impacts from dog fouling are expected, as dog walking is common along the foot paths and beaches that flank the Harbour. Areas of saltmarsh in the western and north eastern parts of the Harbour will reduce the level of dog walking in these areas. Overall, the risk of this source of contamination is considered to be like that described in the 2013 Sanitary Survey and no update to the sampling plan is required on this basis.

4 Hydrodynamics/Water Circulation

Langstone Harbour is hydraulically connected to three other waterbodies; Portsmouth Harbour to the west via Ports Creek, Chichester Harbour to the east via Bridge Lake / New Cut, and the Solent to the south via Langstone Channel. As a result of this, the patterns of water circulation within the Harbour are complex. Much of the Harbour's area is intertidal, and tidal circulation will be the dominant driver of water circulation. The 2013 Sanitary Survey describes that the majority of water exchange happens via the connection to the Solent, with water flooding in and up the main tidal channels before spreading out over the intertidal areas, with the reverse happening on the ebb. There is no evidence that the patterns of water movement within Langstone Harbour will have changed significantly since the 2013 Sanitary Survey was published. Shellfish in the intertidal areas (generally thought to be the clam species) will be subject to contamination from local point sources, whereas shellfish in subtidal areas (oysters) will continue to be subject to contamination from sources farther away. No update to the sampling plan is necessary, as the recommendations made in the 2013 Sanitary Survey to account for the impact of water circulation within the Harbour continue to be valid.

5 Rainfall

The complete record of rainfall data for the Eastney Rain Gauge at SZ 67354 99333 (ID: 322488) was downloaded from the Environment Agency's hydrology data explorer[7]. This station was chosen as it is located near the mouth of Langstone Harbour, approximately 1 km from the southern tip of the *South East Langstone Harbour* Classification Zone and is the closest and most representative monitoring station. The data were subdivided into 2003 – 2012 (pre-sanitary survey) and 2013 – 2023 (post-sanitary survey) and processed in R (R Core Team, 2021). These data were used to determine whether any changes in rainfall patterns had occurred since the original sanitary surveys were published. The rainfall data are summarised in Table 5.1 and the rainfall levels per month are shown in Figure 5.1.

Table 5.1 Summary statistics for the period preceding and following the original sanitary survey, from the Eastney Rain Gauge.

Period	Mean Annual Rainfall	Percentage Dry Days	Percentage Days Exceeding 10 mm	Percentage Days Exceeding 20 mm
2003 - 2012	761.38	56.36	23.28	13.78
2013 - 2023	765.89	51.52	25.77	16.44

[7] Environment Agency's Hydrology Data Explorer. Available at: https://environment.data.gov.uk/hydrology/explore#/landing.

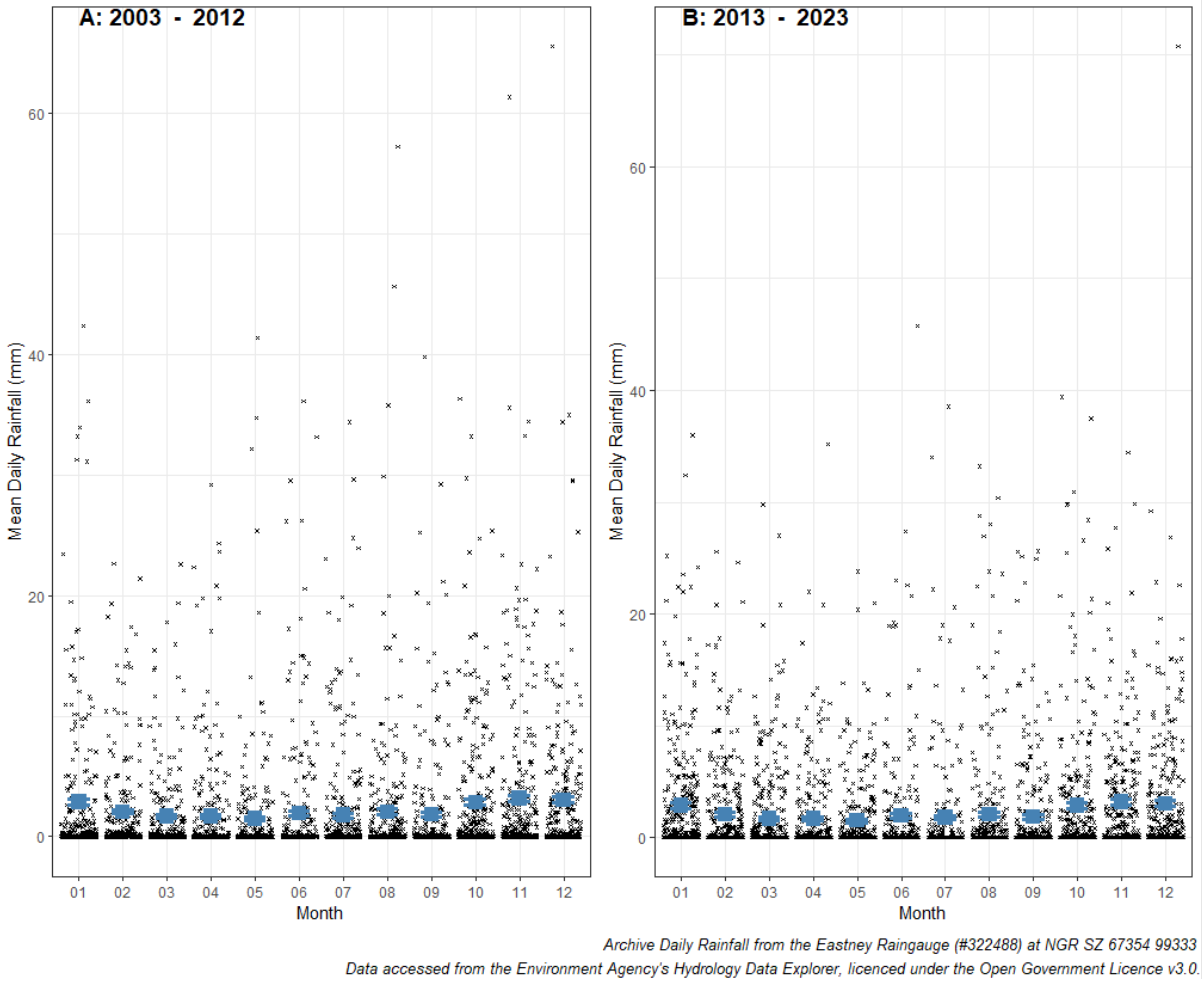

Figure 5.1 Mean daily rainfall per month at the Eastney Rain Gauge (NGR: SZ 67354 99333) for the period (A) 2003 - 2012 and (B) 2013 - 2023.

The data show that the annual rainfall levels in the catchment have increased by approximately 4.5 mm per year, with the percentage of dry days decreasing and the percentage of days with heavy (>10 mm/day) rainfall increasing. However, approximately half of the days had no rainfall at all, suggesting that the area is notably 'dryer' than other areas of the country. Two sample t-tests indicated that there was no significant difference ($p > 0.05$) in the mean daily rainfall per month for the 2003 – 2012 and 2013 – 2023 periods.

Rainfall leads to increased faecal loading through two factors: elevated levels of surface runoff and increased spill events from intermittent discharges, particularly during periods of heavy rain. Rainfall levels during both periods were greatest in winter months (November – February), and so levels of runoff etc. would be expected to be greatest during this time. However, as the rainfall patterns have remained (statistically) similar across the two time periods, significantly altered bacterial loading due to these factors is unlikely and as such sampling recommendations made in the original sanitary survey to capture the influence of runoff and spill events remain valid.

6 Microbial Monitoring Results

6.1 Official Control Monitoring

6.1.1 Summary Statistics and geographical variation

Mean Official Control Monitoring results for *E. coli* concentrations at RMPs sampled in the Langstone Harbour BMPA since 2010 are presented spatially in Figure 6.1 and summary statistics are presented in Table 6.1. This data was obtained through a request to Cefas, but it is freely available on the datahub[1].

A total of 12 RMPs have been sampled within this BMPA since 2010, although fewer than 10 samples were collected from 5 RMPs. Four RMPs, B019A, B019B, B019C and B019D, were all sampled prior to the publication of the original sanitary survey, and sampling ceased in November 2013, following the recommendations of that report. Sampling at the remaining eight RMPs began in either late 2013 or throughout 2014, again following the recommendations of the 2013 Sanitary Survey. Only two RMPs are currently sampled, these are Langstone Channel (B019L) and Stoke Common Lake (B019I), sampled for native oyster and *M. mercenaria* respectively. These RMPs have been sampled since December 2013 and January 2014 respectively. Sampling at the RMPs no longer in use was stopped because of a lack of stock and the Classification Zones it was used to represent were declassified. None of these RMPs have been sampled since 2017.

Both of the RMPs currently in use have returned results above the 46,000 *E. coli* MPN/100 g threshold. Both RMPs are situated on the eastern side of Langstone Harbour and are situated only 200 m from each other. Results at the native oyster RMP (B019L) have tended to be poorer (higher *E. coli* concentrations), with this RMP returning a higher percentage of results above all of the classification thresholds. When considering the inactive RMPs, *Tapes* spp. RMPs have returned higher *E. coli* concentrations than all other species, and native oyster RMPs have returned higher *E. coli* concentrations than *M. mercenaria* RMPs. Whilst limited inference can be drawn from monitoring data that is >6 years old, it would suggest that *M. mercenaria* RMPs should not be used as indicators for *Tapes* spp. Classification Zones.

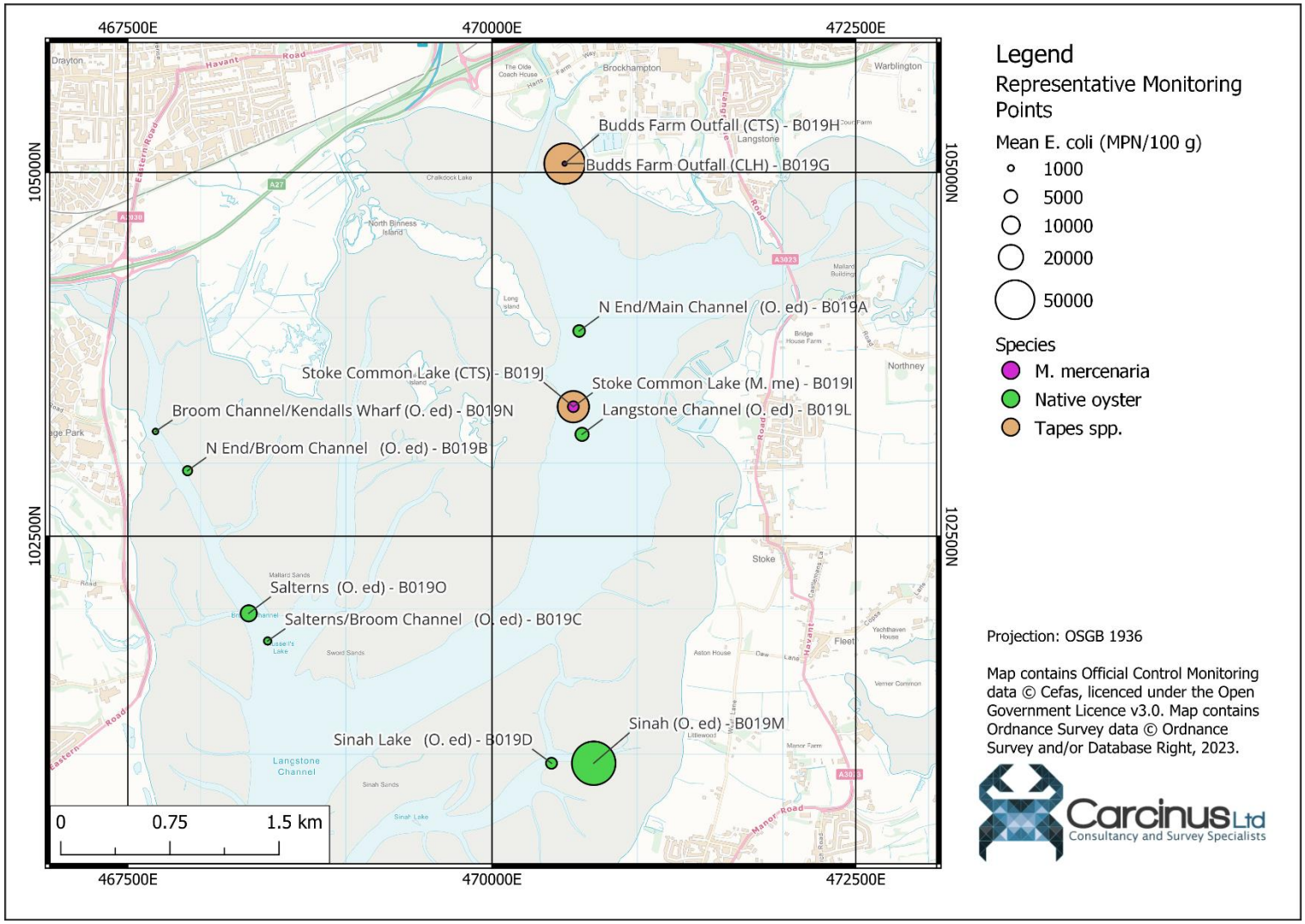

Figure 6.1 Mean E. coli results from Official Control Monitoring at bivalve RMPs in the Langstone Harbour BMPA.

Table 6.1 Summary statistics of Official Control monitoring at bivalve RMPs in the Langstone Harbour BMPA.

RMP (Species)	NGR	Species	No.	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Broom Channel/Kendalls Wharf (O. ed) - B019N	SU67690322	Native oyster	5	14/05/2014	11/11/2015	900.00	140	2300	60.00	0.00	0.00
Budds Farm Outfall (CLH) - B019G	SU70500506	M. mercenaria	6	17/12/2013	14/05/2014	721.67	20	3500	33.33	0.00	0.00
Budds Farm Outfall (CTS) - B019H	SU70500506	Tapes spp.	5	14/01/2014	14/05/2014	54460.00	2400	240000	100.00	40.00	20.00
Langstone Channel (O. ed) - B019L	SU70620320	Native oyster	91	17/12/2013	18/04/2023	5339.46	45	240000	76.92	15.38	1.10
N End/Broom Channel (O. ed) - B019B	SU67910295	Native oyster	46	18/01/2010	12/11/2013	2384.13	20	35000	69.57	10.87	0.00
N End/Main Channel (O. ed) - B019A	SU70600391	Native oyster	47	19/01/2010	12/11/2013	4052.55	50	92000	78.72	14.89	2.13
Salterns (O. ed) - B019O	SU68330197	Native oyster	7	14/05/2014	11/11/2015	8337.14	50	54000	71.43	14.29	14.29
Salterns/Broom Channel (O. ed) - B019C	SU68460178	Native oyster	47	18/01/2010	12/11/2013	1450.00	20	16000	70.21	6.38	0.00

RMP (Species)	NGR	Species	No.	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Sinah (O. ed) - B019M	SU70700094	Native oyster	26	09/09/2014	06/11/2017	62289.69	20	1600000	61.54	3.85	3.85
Sinah Lake (O. ed) – B019D	SU70410094	Native oyster	49	18/01/2010	12/11/2013	3469.80	20	92000	71.43	10.20	2.04
Stoke Common Lake (CTS) - B019J	SU70560339	Tapes spp.	9	14/01/2014	09/09/2014	32856.67	20	160000	88.89	44.44	33.33
Stoke Common Lake (M. me) - B019I	SU70560339	M. mercenaria	114	14/01/2014	18/04/2023	3413.92	18	240000	31.58	5.26	1.75

Figure 6.2 - Figure 6.4 present box and violin plots of *E. coli* monitoring at RMPs within the Langstone Harbour BMPA. One-way analyses of variance (ANOVA) tests were performed on the data to investigate the statistical significance of any differences between the monitoring results from the two RMPs. Significance was taken at the 0.05 level. All statistical analysis described in this section was undertaken in R (R Core Team, 2021).

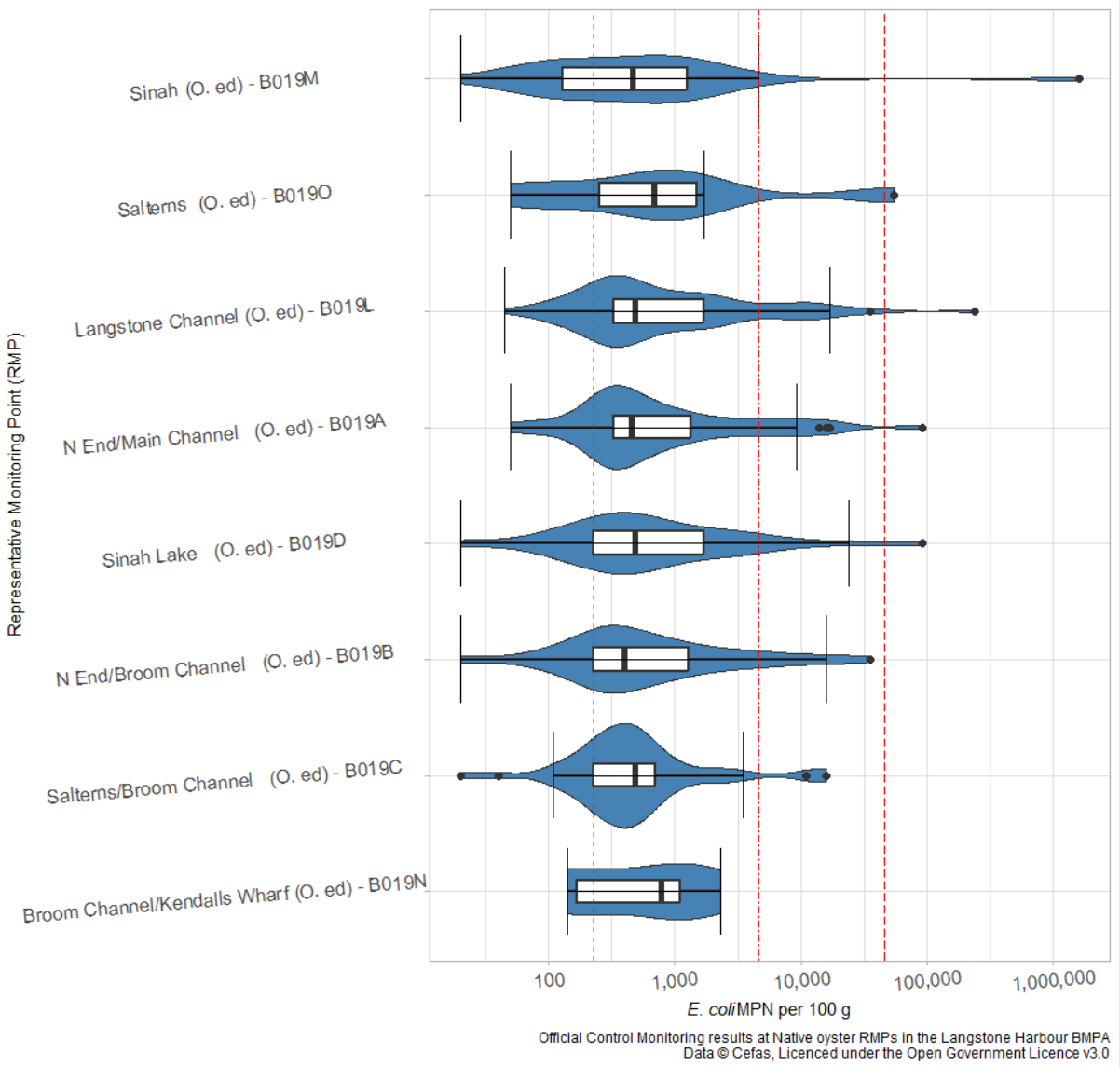

Figure 6.2 Box and violin plots of E. coli concentrations at native oyster RMPs sampled in the Langstone Harbour BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution of the monitoring data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g.

Data from the native oyster RMPs (Figure 6.2) shows that the highest median *E. coli* concentration was found at Broom Channel/Kendalls Wharf B019N, and the lowest at N End/Broom Channel B019B. All of the median *E. coli* concentrations are above the 230 *E. coli*

MPN/100 g threshold, but below the 4,600 *E. coli* MPN/100 g threshold. No significant differences were found in the data.

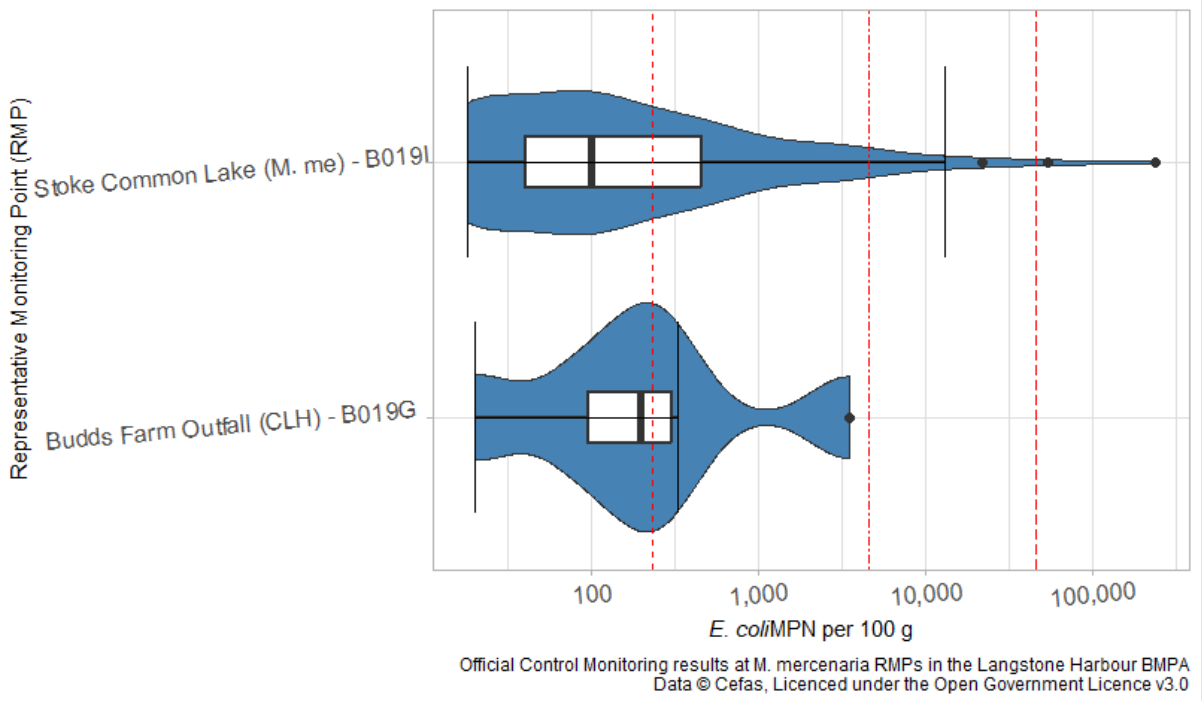

Figure 6.3 Box and violin plots of E. coli concentrations at M. mercenaria RMPs sampled in the Langstone Harbour BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution of the monitoring data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g.

The data fitted to the *M. mercenaria* monitoring data (Figure 6.3) shows that Budds Farm Outfall B019G returned a higher median result than Stoke Common Lake B019I, but that both are below the 230 *E. coli* MPN/100 g threshold. There is no temporal overlap between the two RMP monitoring periods, so limited inference can be drawn.

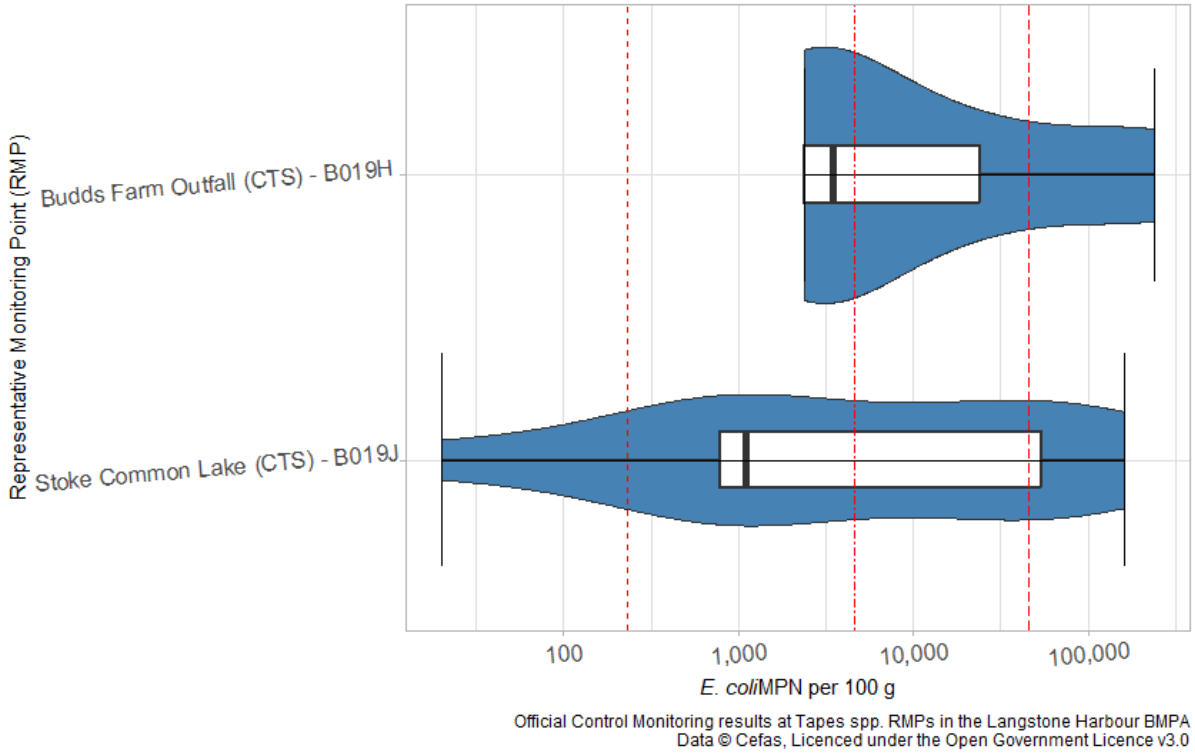

Figure 6.4 Box and violin plots of E. coli concentrations at Tapes spp. RMPs sampled in the Langstone Harbour BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution of the monitoring data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g.

The median results of both *Tapes* spp. RMPs are above the 230 *E. coli* MPN/100 g threshold but below the 4,600 *E. coli* MPN/100 g threshold. There were no significant differences in the monitoring data ($p > 0.05$). As no samples have been collected at these RMPs since mid-2014, no inference can be drawn from this pattern on the current contamination sources affecting this BMPA.

6.1.2 Overall temporal pattern in results

The overall temporal pattern in shellfish flesh monitoring results for native oyster, *M. mercenaria* and *Tapes* spp. clams are presented in Figure 6.5, Figure 6.6 and Figure 6.7 respectively.

The plotted monitoring data from the native oyster RMPs (Figure 6.5) clearly indicates the end of monitoring at four native oyster RMPs following the recommendations made in the 2013 Sanitary Survey. The trend lines indicate that prior to sampling stopping, concentrations of *E. coli* at these RMPs were broadly consistent, with the trend lines all falling above the 230 *E. coli* MPN/100 g threshold but below the 4,600 *E. coli* MPN/100 g threshold. The trend lines also indicate that concentrations of *E. coli* were decreasing. Concentrations of *E. coli* at the three RMPs recommended in the original sanitary survey, but not currently sampled (Broom Channel/Kendalls Wharf B019N, Salterns B019O, and

Sinah B019M) were variable, and showed an increase prior to stopping. The trend line fitted to the monitoring data from the Langstone Channel B019L RMP has continually fallen above the 230 *E. coli* MPN/100 g threshold but below the 4,600 *E. coli* MPN/100 g threshold. Since late 2020, concentrations of *E. coli* within shellfish sampled at this RMP have been decreasing.

Only six samples were collected from the Budds Farm Outfall B019G RMP (Table 6.1), meaning that no significant inference can be drawn from the trend line fitted to this data (Figure 6.6). The trend line fitted to the Stoke Common Lake B019I RMP has fallen below the 230 *E. coli* MPN/100 g threshold for the majority of time it has been sampled, only passing above this level in late 2022/early 2023. The frequency of elevated (above 230 MPN/100 g) results from this RMP has been increasing in recent years. This is likely due to issues associated with releases from intermittent discharges and pleasure craft discussed earlier in this report.

The trend lines fitted to the monitoring data from the *Tapes* spp. RMP indicate that concentrations of *E. coli* within shellfish collected at these positions was falling between late 2013 and mid 2014 (Figure 6.7). However, as no samples have been collected at these RMPs since mid 2014, no inference can be drawn from this pattern on the current contamination sources affecting this BMPA.

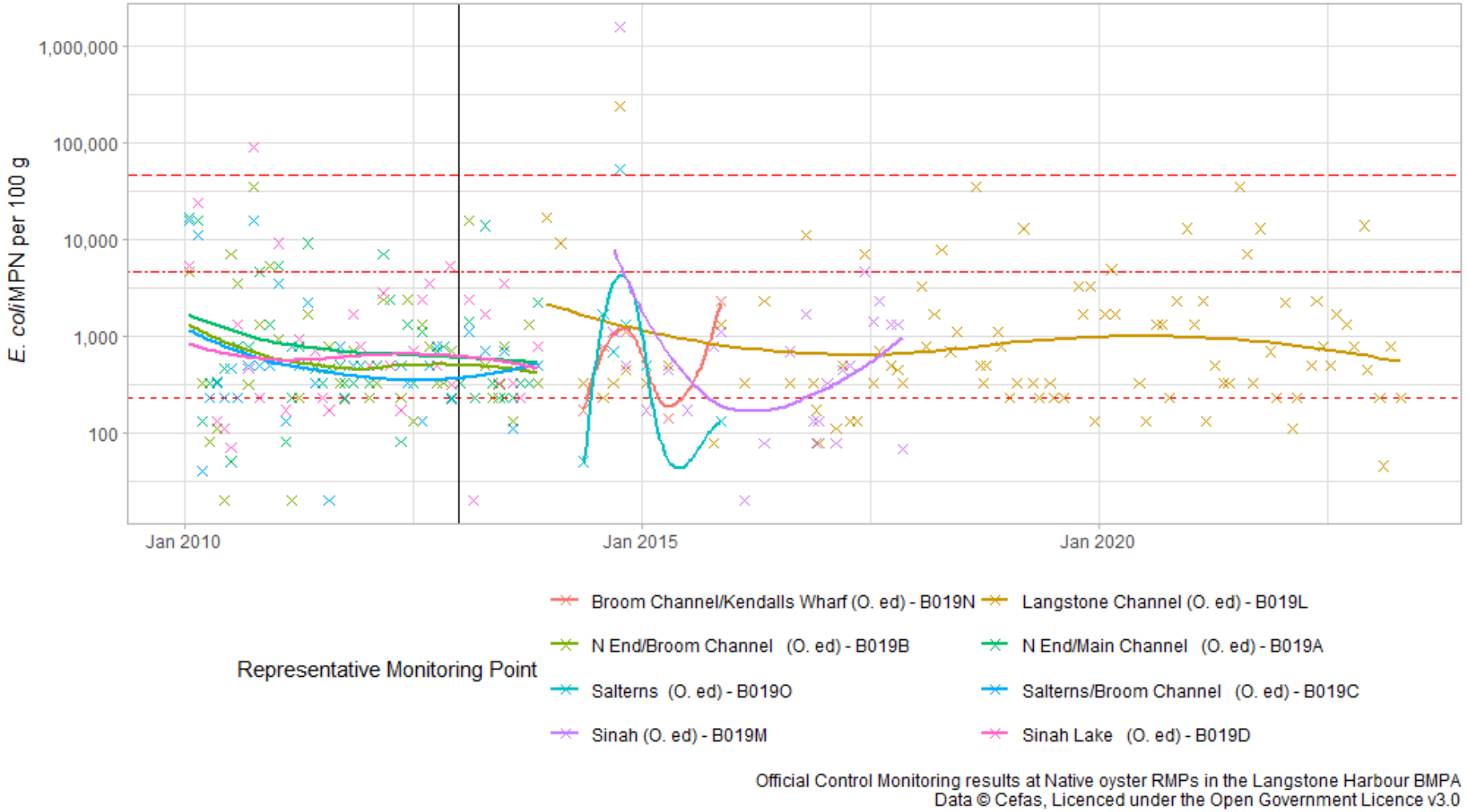

Figure 6.5 Timeseries of E. coli levels at native oyster RMPs sampled in the Langstone Harbour BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.

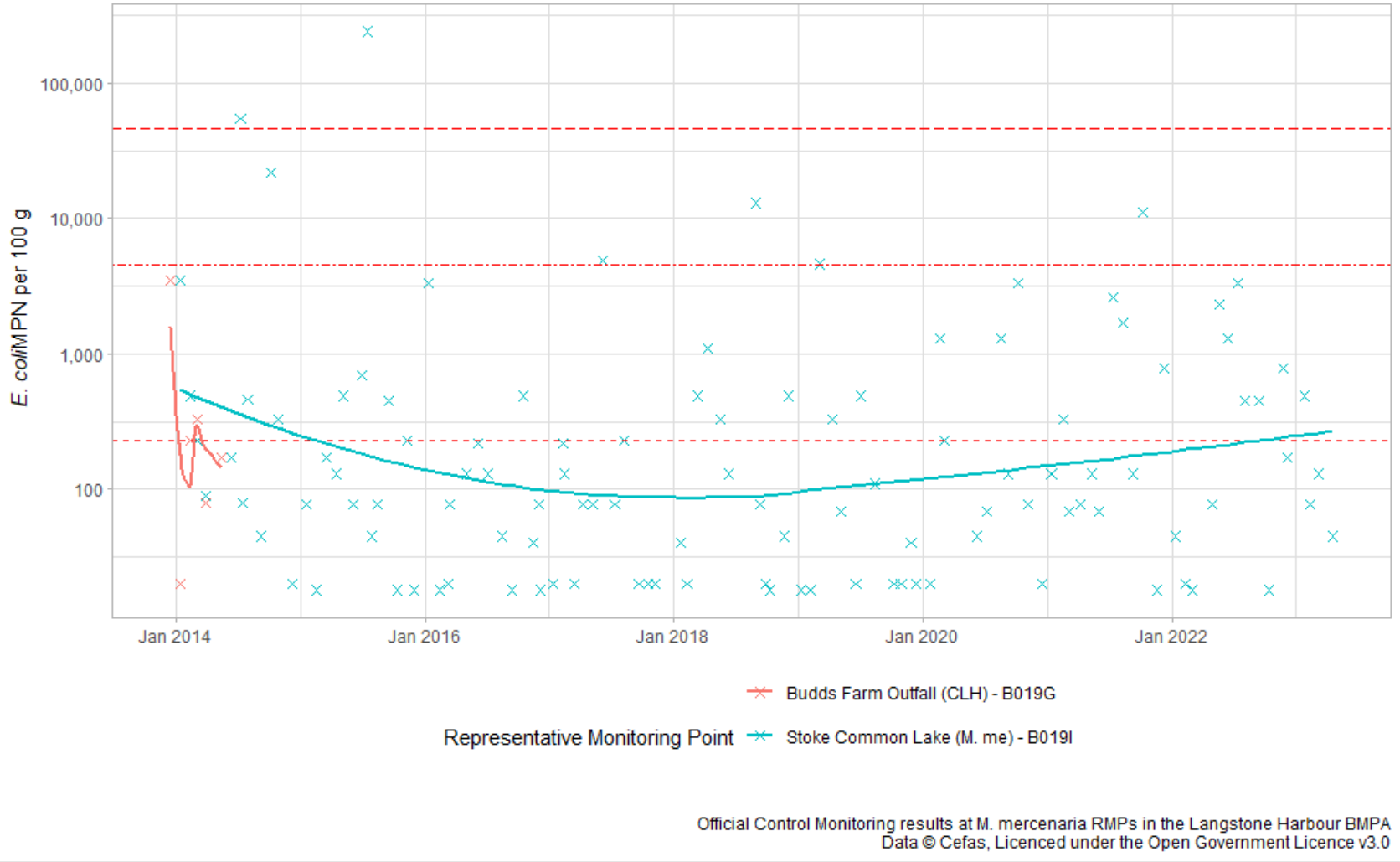

Figure 6.6 Timeseries of E. coli levels at M. mercenaria RMPs sampled in the Langstone Harbour BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.

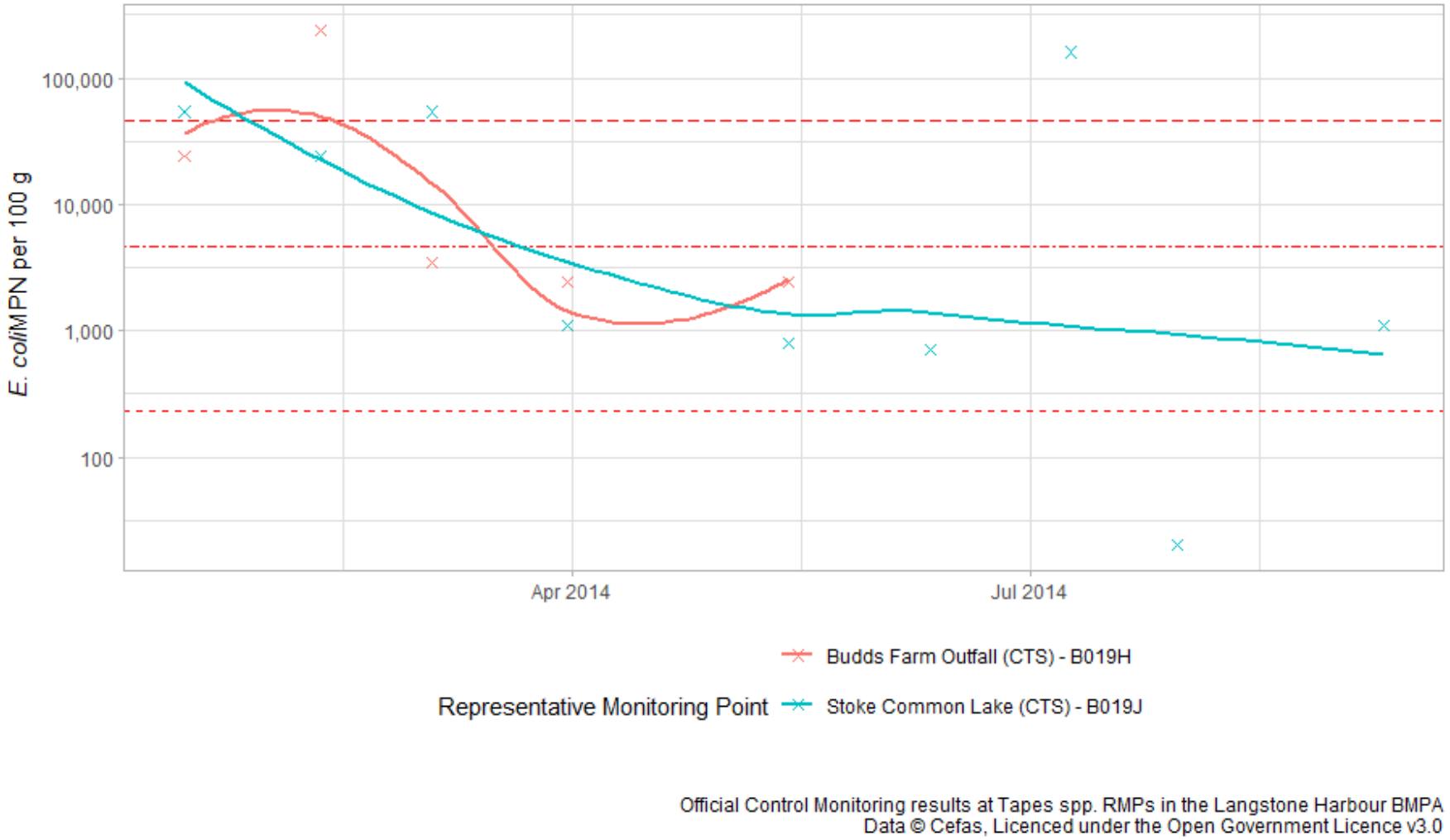

Figure 6.7 Timeseries of E. coli levels at Tapes spp. RMPs sampled in the Langstone Harbour BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.

6.1.3 Seasonal patterns of results

The seasonal patterns of *E. coli* levels at RMPs in the Langstone Harbour BMPA were investigated and are shown for native oysters in Figure 6.8 and *M. mercenaria* clams in Figure 6.9. No data is shown for *Tapes* spp. clams as the RMPs were sampled for approximately 8 months and so no seasonal aggregations can be displayed.

The data for each year were averaged into the four seasons, with, spring from March – May, summer from June – August, autumn from September – November and winter comprising data from December – February the following year. Two-way ANOVA testing was used to look for significant differences in the data, using both season and RMP (if there is more than one RMP for a given species) as independent factors (i.e., pooling the data across season and RMP respectively), as well as the interaction between them (i.e., exploring seasonal differences within the results for a given RMP). Significance was taken at the 0.05 level.

Within the native oyster monitoring data (Figure 6.8), median results in autumn and winter months tended to be higher than at other times of year. This is likely due to increased levels of rainfall at these times of year causing additional surface runoff and discharges from storm overflows in the catchment. No significant differences were found in the data.

The only seasonal comparison that can be taken from the *M. mercenaria* data comes from the Stoke Common Lake (B019I) RMP, as there is only six months data from the Budds Farm Outfall B019G RMP. At the Stoke Common Lake RMP, monitoring data recorded in summer months tended to be higher than at other times of year. No significant differences were found, but higher *E. coli* concentrations in summer could indicate additional discharges from pleasure craft.

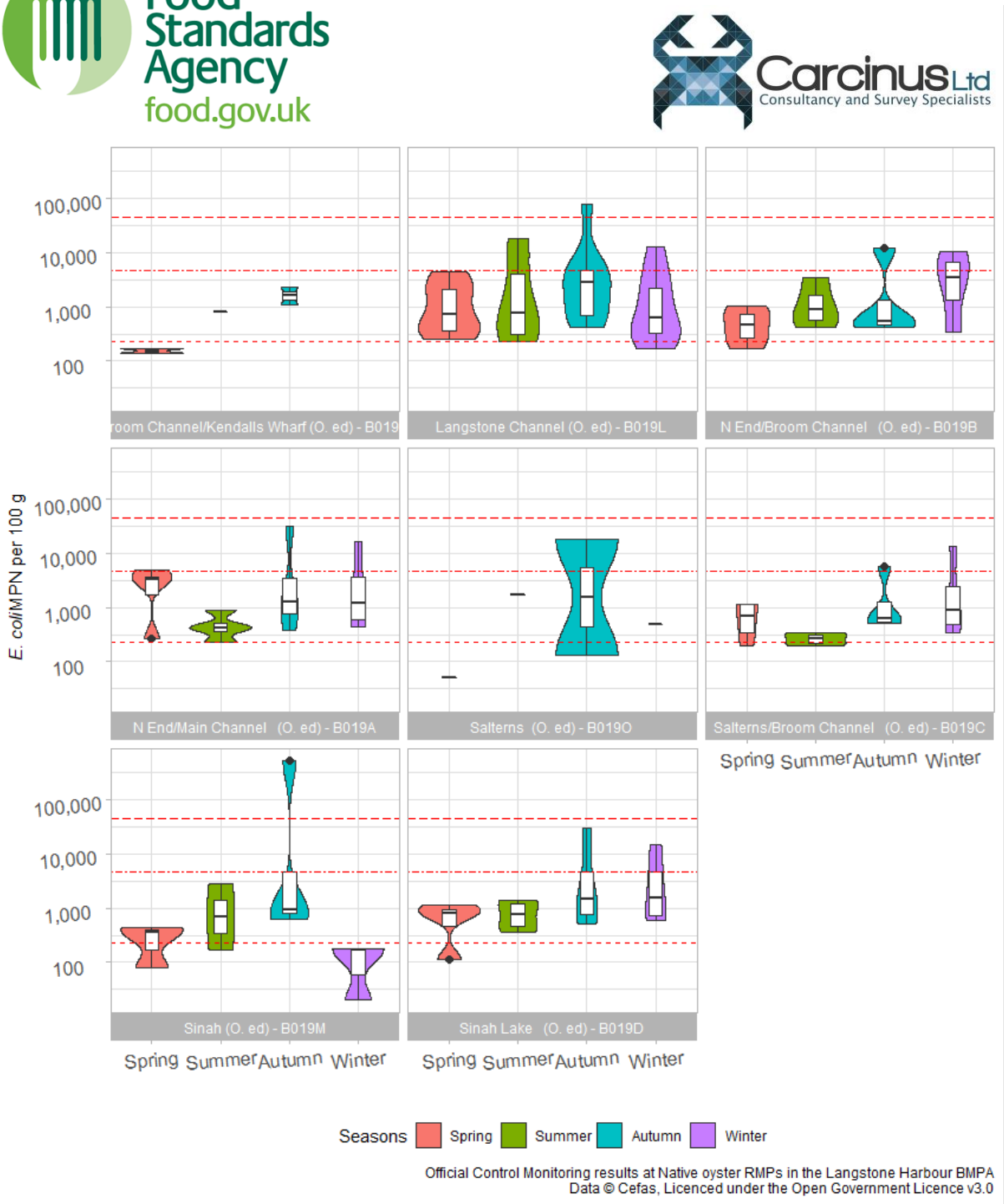

Figure 6.8 Box and violin plots of E. coli levels per season at native oyster RMPs sampled within the Langstone Harbour BMPA since 2010. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli *MPN/100 g.*

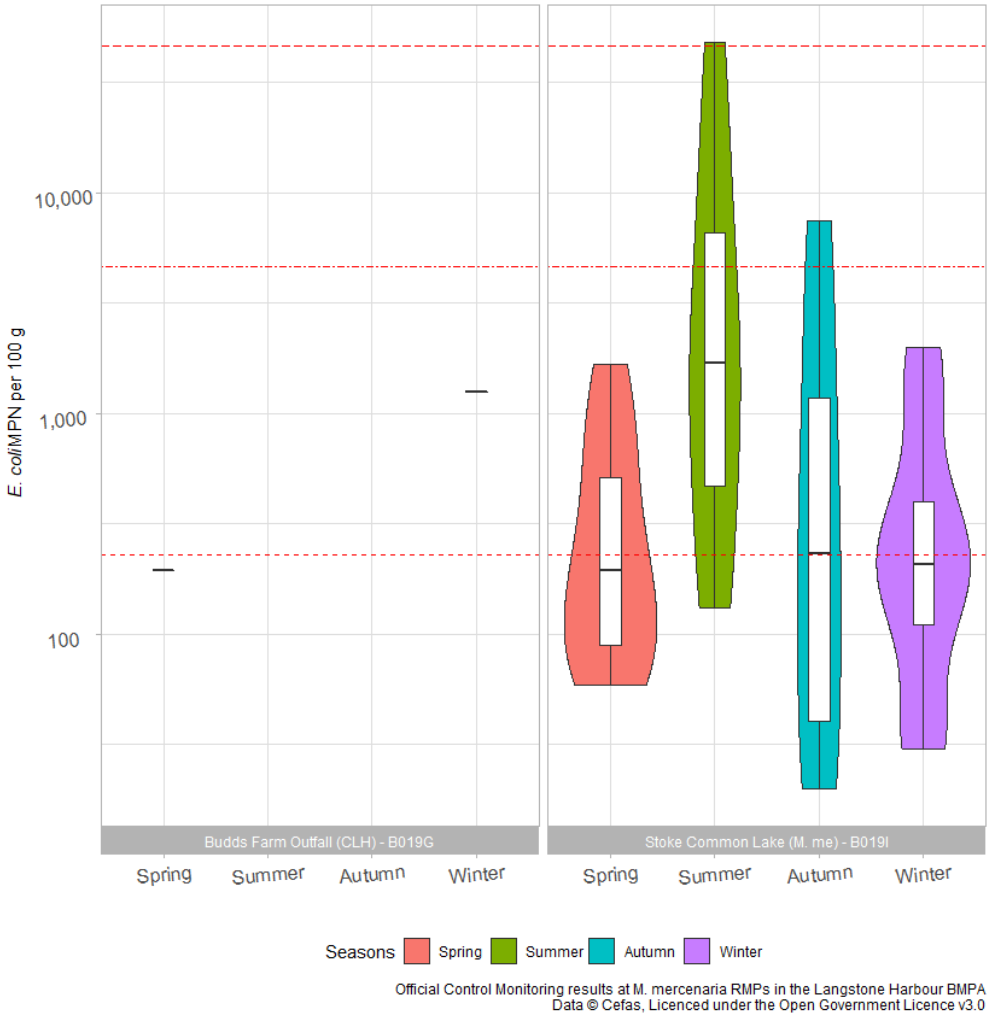

Figure 6.9 Box and violin plots of E. coli levels per season at M. mercenaria RMPs sampled within the Langstone Harbour BMPA since 2010. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli *MPN/100 g.*

6.2 Bathing Water Quality Monitoring

The status of EC bathing waters near to and within the BMPA is also of relevance to this review. During initial consultations, the authors of this review were informed that bathing within the harbour is discouraged and does not often occur, mainly due to the strong tidal currents and significant areas of soft intertidal mud. As a consequence, there are no designated bathing water monitoring points within Langstone Harbour itself, but there are six locations on the seafronts of Portsmouth, Hayling Island and West Wittering. The recent classification status of these monitoring points is summarised in Table 6.2. It should be noted that bathing water sampling only occurs during the summer period (May to September inclusive) and therefore may not represent the potential for increased faecal loading during winter months. However, bathing water quality results do provide an indication of water quality in the area during the bathing water season, and suggest that generally water flushing into the Harbour on flooding tides will have low *E. coli* concentrations.

Table 6.2 Summary of EA bathing water quality monitoring at locations relevant to the Langstone Harbour BMPA.

Bathing Water Monitoring Point	2014	2015	2016	2017	2018	2019	2020	2021	2022
Southsea East	Guideline	Good	Excellent	Excellent	Excellent	Excellent	Unassessed	Good	Sufficient
Eastney	Guideline	Excellent	Excellent	Excellent	Excellent	Excellent	Unassessed	Excellent	Excellent
Beachlands West	Guideline	Excellent	Excellent	Excellent	Excellent	Excellent	Unassessed	Excellent	Excellent
Beachlands Central	Guideline	Excellent	Excellent	Excellent	Excellent	Excellent	Unassessed	Excellent	Excellent
Eastoke	Guideline	Excellent	Excellent	Excellent	Excellent	Excellent	Unassessed	Excellent	Excellent
West Wittering	Guideline	Excellent	Excellent	Excellent	Excellent	Excellent	Unassessed	Excellent	Excellent

6.3 Action States

Since the publication of the 2013 Sanitary Survey of Langstone Harbour, the following action states have been triggered within the BMPA.

- On 09 July 2014, a result of 54,000 *E. coli* MPN/100 g was recorded at Stoke Common Lake B019I. No other high results were recorded in the area, but subsequent action state sampling on 16 July and 30 July 2014 returned results of 80 and 460 *E. coli* MPN/100 g respectively. No subsequent monthly sampling results were included in the Action State report. Investigations did not find grounds to waive the result.
- On 07 October 2014, the following high results were recorded:
    - 54,000 *E. coli* MPN/100 g at Broom Channel/Kendalls Wharf B019N,
    - 240,000 *E. coli* MPN/100 g at Langstone Channel B019L,
    - 1,600,000 *E. coli* MPN/100 g at Sinah B019M,
    - 22,000 *E. coli* MPN/100 g at Stoke Common Lake B019I,

  No action state sampling was undertaken, but subsequent monthly sampling returned no high results. The source of the high results was suspected to result from a discharge from the Budds Farm storm overflow, although this release was within the asset's consented amount. There was also very heavy rain at the time.

The investigations that followed the action state events described above that there is often heavy rainfall and suspected (but not confirmed) spills from intermittent discharges in the catchment that coincide with the elevated official control monitoring results. As such, additional consideration should be given to the presence of intermittent discharges when determining RMP locations in any updated sampling plan.

7 Conclusion and overall assessment

Langstone Harbour is a large natural harbour situated on the south coast of England. A narrow mouth connects the harbour to the Solent, and two smaller channels in the north western and north eastern corners connect it to Portsmouth Harbour (to the west) and Chichester Harbour (to the east). The BMPA is currently classified for three species, *M. mercenaria* clams and native *Ostrea edulis* and Pacific oysters *Crassostrea gigas*. The entire harbour is a public fishery and all fishing involves the collection of wild stock. There are several Southern IFCA byelaws that apply to the area, including those that prohibit the use of bottom towed fishing gear in specific areas, and those that prohibit all fishing in designated seagrass areas. We understand the current output ofthe fishery is approximately 80 tonnes per annum, but it is not clear what the proportion of this total comes from each of the harvested species. During initial consultations, S-IFCA also stated that there is active fishing for *Tapes* spp. clams, which are recommended for classification as part of this review. There is also an active fishery for king scallops *Pecten maximus*, but classification arrangements for this species are beyond the scope of this review.

The results of the 2021 Census were compared to that of the 2011 Census to give an indication of population changes in the catchment since the 2013 Sanitary Survey was published. These data suggest that the population of the catchment has grown by approximately 16%. The main population centres of the catchment continue to be the city of Portsmouth to the west and the town of Havant to the north. The population density of Hayling Island, to the east of the Harbour, is much lower. The area sees a significant population increase in summer months due to tourists, but no information has been received to date to suggest that the existing sewerage network is insufficient to handle this increase.

There are no continuous water company discharges to the waters of Langstone Harbour, the main sewage treatment works in the area, Budds Farm, has discharged to a long sea outfall 5 km from the mouth of Langstone Harbour since 2001. As a result, the main concern over water company owned discharges exists over the impact of intermittent discharges. During initial consultations, the EA advised that improvements were made to the Fort Cumberland CSO in 2014 to increase storage and improve screening. Similar improvements were also made to Budds Farm and Mainland Drayton WPS in 2016. For AMP8 (2025 – 2030) additional improvements to the Budds Farm and Court Lane Cosham CSO to reduce the frequency of spills are planned, which should reduce the impact of these discharges on the bacteriological health of the shellfishery. Consideration should still be given to the presence of any intermittent discharges near to Classification Zones. The EA assessment of this shellfish water notes that water company owned discharges, particularly intermittent discharges are a key source of microbiological contamination within this shellfish water. Action State results in the BMPA have been attributed to high levels of rainfall, which can lead to discharges from Storm Overflows and other intermittent discharges. Generally, the northern parts of the harbour are at a greater risk of this source of contamination.

Across all groups, livestock populations increased across the catchment between 2013 and 2021, but there was a large increase in poultry populations. Land cover maps show that there are some areas of pasture immediately adjacent to the Harbour, but these areas have not changed significantly since the 2013 Sanitary Survey was published. However, due to the small livestock population, contamination from agricultural sources is not considered to be a significant contaminating influence on this BMPA.

Langstone Harbour supports a variety of wildlife species. The group that are most likely to contribute significant levels of contamination to the shellfishery are wading birds, as they forage and defecate directly on intertidal shellfish beds. The average winter-count of water birds has decreased compared to the time of the 2013 sanitary survey, and there continue to be internationally and nationally significant populations of several species. It is hard to reliably account for this source of pollution however as the aggregations of birds will shift from year to year based on the distributions of their prey.

There are two small commercial berths within Langstone Harbour, but merchant shipping is not considered to be a risk as vessels of this type are prohibited from making overboard

discharges within 3 nm of land. The main risk factor from boating activities will come from pleasure craft. Comparison with the situation described in the 2013 Sanitary Survey suggests that overall, the level of recreational boating activity in the area remains high, and there is a chance that the main navigational channels and areas of moorings will receive some contamination, particularly in the summer. However, the recommendations made in the 2013 report remain valid as the areas at risk have not changed.

Official Control monitoring at the two currently active RMPs shows that the native oyster RMP has returned higher results than the *M. mercenaria* RMP nearby. The median value at the native oyster RMP exceeds the 230 MPN/100 g threshold but the value at the *M. mercenaria* RMP falls below this. It is not clear whether this is due to significantly different levels of background contamination near the two RMPs, or differences in the natural rates of *E. coli* uptake, although it should be noted that both RMPs are situated in one of the main drainage channels. The trend in recent monitoring results at the *M. mercenaria* RMP is that shellfish flesh hygiene is declining. High results at this RMP are most probably due to issues associated with releases from intermittent discharges and pleasure craft discussed earlier in this report.

No significant differences were found in the monitoring data, although results from *Tapes* spp. RMPs were notably higher than all other species. This suggests that no other species should be used as an indicator for *Tapes* spp. should reclassification be required. No significant seasonal differences in the data were found. Action states recorded in this BMPA have been attributed to high (but not 'exceptionally' high) rainfall levels causing discharges from Storm Overflows within their consents.

Based on the information available, there do not appear to be any significant knowledge gaps that would justify a shoreline survey. There have been some changes to the sources of contamination in the area, although these have been reliably accounted for by the desk-based assessment.

Having reviewed and compared the desk-based study with the findings of the original sanitary survey in 2013, the FSA is content that a shoreline assessment is not required.

8 Recommendations

Recommendations for the various classification zones within the Langstone Harbour BMPA are described below and are summarised in Table 9.1. Figure 2.1 shows the boundaries of fishing-prohibited areas within Langstone Harbour. This figure indicates that there are currently overlaps between the current boundaries of the Classification Zones in this BMPA and the areas covered by S-IFCA byelaws (S-IFCA prohibited areas). All Classification Zones should have their boundaries adjusted to about the edges of these areas. There is evidence of commercial hand gathering within the BMPA. During secondary consultation, S-IFCA confirmed that these hand gatherers are permitted to fish within the 'Dredge Permit Byelaw' area, but not the seagrass protected areas. Due to the practicalities of hand-gathering shellfish, it is considered that aligning the CZ boundaries with IFCA-byelaw areas

will not cause a reduction in hand gathering resource, as there are no intertidal areas of the existing CZ boundaries that would be lost by the boundary change.

8.1 Native oyster

Langstone Channel

This CZ covers an area of 4.44 km² and is situated on the eastern side of the harbour. In the 2013 Sanitary Survey, this zone was positioned south of the *Budds Farm* CZ, north of the *Sinah Lake* CZ and east of the *Salterns* and *Broom Channel* CZs. None of these CZs are currently classified. There are currently sections of this CZ that overlap the S-IFCA prohibited areas (Figure 2.1), and so it is recommended that the zone boundaries are updated so that there is no overlap. The 2013 Sanitary Survey identified that this CZ would principally be affected by up-harbour sources, including intermittent water company owned discharges. It recommended placing an RMP in a deep water channel at SU 7060 0320. The main sources of contamination have not changed since the 2013 Sanitary Survey was published, and the existing RMP is not within a S-IFCA prohibited area, so it should be retained. The proposed new boundaries of this CZ are shown in Figure 8.1.

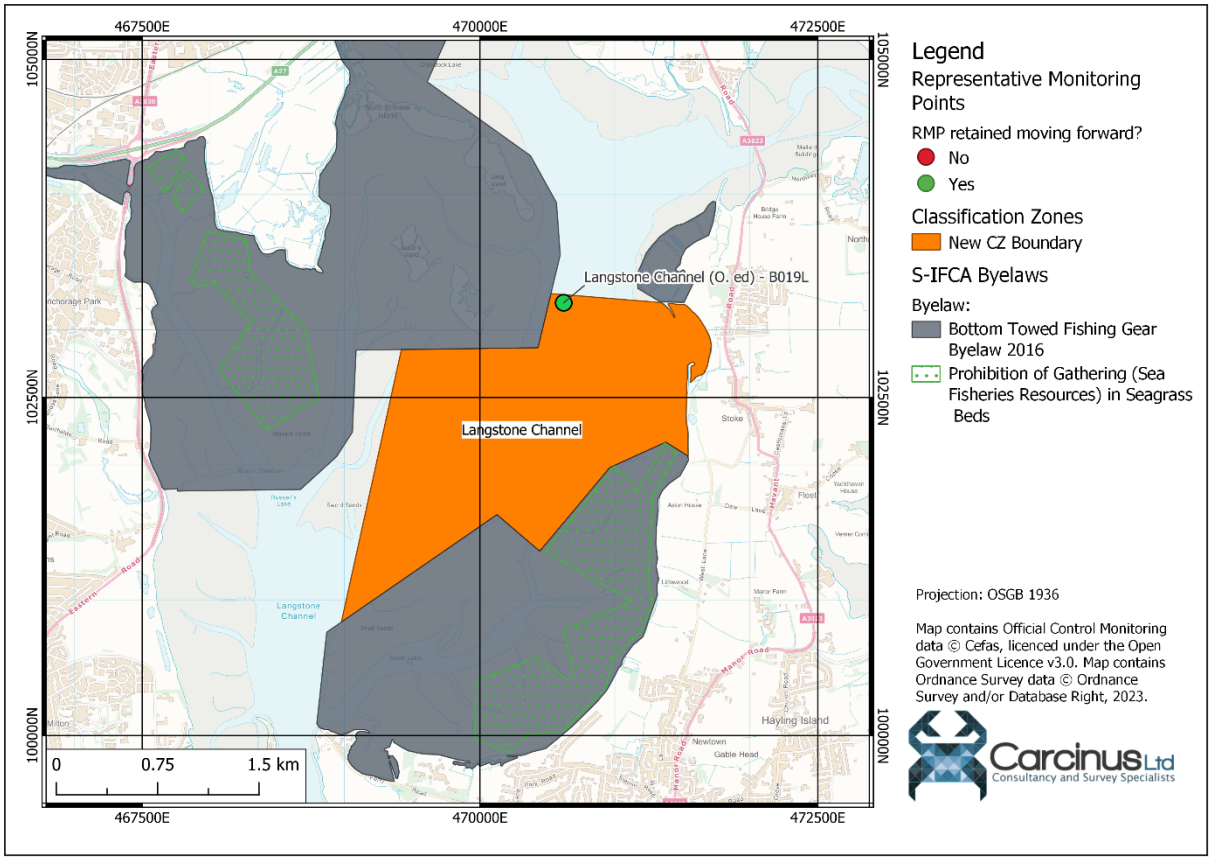

Figure 8.1 Adjusted native oyster CZ boundaries within Langstone Harbour.

8.2 Pacific oyster

Cefas report into the use of indicator species found that in all cases Pacific oysters can be used to adequately represent native oysters and *vice versa* (Cefas, 2014). As such, it is recommended that Pacific oyster Classification Zones within this BMPA continue to be

represented by native oyster samples. The boundaries of the Pacific oyster CZ should be updated in the same way as the native oyster CZs.

8.3 M. mercenaria clams

South East Langstone Harbour

This CZ covers an area of 12.18 km² and covers the majority of the eastern part of the harbour. The current CZ boundaries are larger than those proposed in the 2013 Sanitary survey, as the zone currently includes part of the originally proposed *Budds Farm* CZ. There are currently sections of this CZ that overlap the S-IFCA prohibited areas (Figure 2.1), and so it is recommended that the zone boundaries are updated so that there is no overlap. The 2013 Sanitary Survey identified that the main sources of contamination included up-harbour sources such as intermittent water company owned discharges, as well as surface outfalls on the adjacent shore of Hayling Island and an area of moorings near the mouth of Langstone Harbour. It recommended placing an RMP at Stoke Common Lake (SU 7094 0291). Up estuary sources, including surface runoff and releases from intermittent discharges continue to be the main contaminating influences on this zone. The LEA confirmed that no suitable stock for RMP placement exists north of the current RMP position, and so it is recommended that the northern boundary of the CZ be brought southward to align with the current RMP (Figure 8.2), also taking into consideration the alterations to the CZ boundaries to avoid conflict with S-IFCA byelaws.

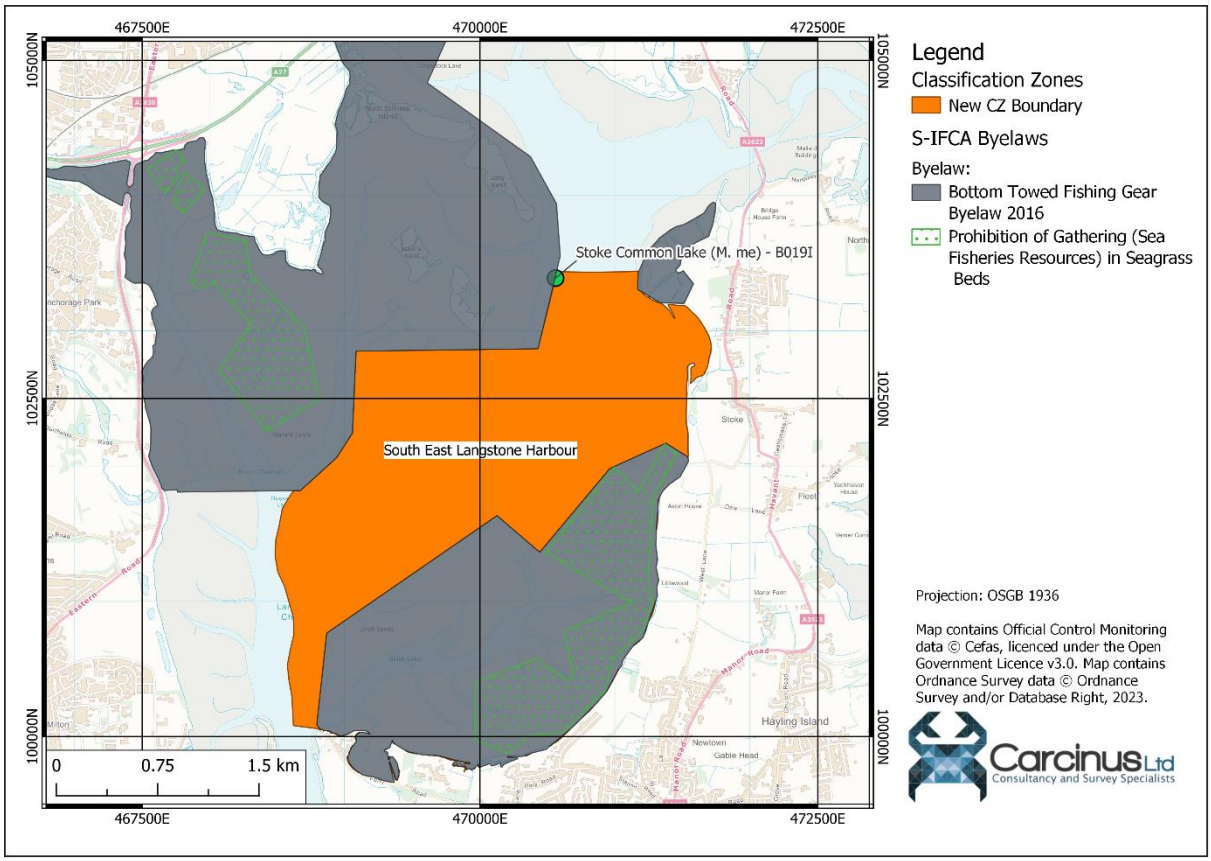

Figure 8.2 Adjusted M. mercenaria CZ boundaries and proposed RMP locations within Langstone Harbour.

8.4 *Tapes* spp. clams

There are currently no active classification zones for *Tapes* spp. clams within the Langstone Harbour BMPA. However, we understand from consultations with S-IFCA that this species is frequently caught throughout the clam fishery. Historic monitoring at the Budds Farm *M. mercenaria* and *Tapes* spp. RMPs in early 2014 indicated that *Tapes* spp. accumulated more *E. coli*, and so it is not recommended that *M. mercenaria* are used as an indicator species. An RMP for *Tapes* spp. in the same location as recommended for *M. mercenaria* would be appropriate. Discussions to determine the exact classification requirements for this species are ongoing between the FSA and LEA.

9 General Information

9.1 Location Reference

Production Area	**Langstone Harbour**
Cefas Main Site Reference	M019
Ordnance survey 1:25,000	Explorer 120
Admiralty Chart	3418

9.2 Shellfishery

Species	Culture Method	Seasonality of Harvest
Native oyster (*Ostrea edulis*)	Wild	Close Season 01 March to 31 October inclusive
Pacific oyster (*Crassostrea gigas*)	Wild	Year round
***Mercenaria mercenaria* clams**	Wild	Year round
Manila clams (*Tapes spp.*)	Wild	Year round

9.3 Local Enforcement Authority(s)

Name	**Portsmouth Port Health Authority** Portsmouth City Council, Regulatory Services, Guildhall Square, Portsmouth PO1 2AL
Website	https://www.portsmouth.gov.uk/services/environmental-health/safety/port-health-authority/
Telephone number	023 9268 8653
E-mail address	porthealth@portsmouthcc.gov.uk

9.4 Sampling Plan

*Table 9.1 Proposed sampling plan for the Langstone Harbour BMPA. Suggested changes are given in **bold red** type.*

Classification Zone	RMP	RMP Name	NGR (OSGB 1936)	Lat / Lon (WGS 1984)	Species Represented	Harvesting Technique	Sampling Method	Sampling Species	Tolerance	Frequency
Langstone Channel	B019L	Langstone Channel	SU 7062 0320	50° 49.443'N, 0° 59.926'W	*Ostrea edulis*; *Crassostrea gigas*	Dredge	Dredge	*O. edulis*	100 m	Monthly
South East Langstone Channel	TBC	TBC	**SU 7049 0448**	**50° 50.133'N, 0° 0.017'W**	*M. mercenaria*	Dredge/Hand	Dredge/Hand	*M. mercenaria*	100 m	Monthly
South East Langstone Channel	**TBC**	**TBC**	**SU 7049 0448**	**50° 50.133'N, 0° 0.017'W**	***Tapes* spp.**	**Dredge/Hand**	**Dredge/Hand**	***Tapes* spp.**	**100 m**	**Monthly**

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Appendices

Appendix I. Event Duration Monitoring Summary for 2022

Site Name	EA Permit	Storm Disc	Outlet NGR	Total Duration (hrs) of spills in 2022	Total Count of Spills in 2022	Distance from centre of nearest CZ
COURT LANE COSHAM SSO - 115958	A00657	Storm discharge at pumping station	SU6622004460	71.07	18	4.60
KIRTLEY CLOSE DRAYTON CSO - 108774	A01387	SO on sewer network	SU6716004640	14.71	12	3.90
BURRFIELDS ROAD PORTSMOUTH CSO - 108405	A01386	SO on sewer network	SU6720002060	0.83	1	3.10
MAINLAND DRAYTON SSO - 115960	A00656	Storm discharge at pumping station	SU6722004240	40.09	22	3.62
ST ANDREWS ROAD PORTSMOUTH CSO - 108474	A01277	SO on sewer network	SU6722004250	4.66	4	3.63
BUDDS FARM HAVANT SSO - 115936	A00751	Storm tank at WwTW	SZ6858099290	647.25	52	3.47
FORT CUMBERLAND ROAD EASTNEY SSO - 110658	A00753	Storm discharge at pumping station	SZ6858099290	27.78	12	3.47
RAMBLERS WAY WATERLOOVILLE CEO - 110201	A01276	Storm discharge at pumping station	SU7006010030	0.00	0	7.73

Site Name	EA Permit	Storm Disc	Outlet NGR	Total Duration (hrs) of spills in 2022	Total Count of Spills in 2022	Distance from centre of nearest CZ
BUDDS FARM HAVANT SE7 CEO - 116073	A00752	Inlet SO at WwTW	SU7067005670	24.12	7	3.38
PRIORSDEAN CRESCENT HAVANT CSO - 108475	A01016	SO on sewer network	SU7103007430	0.38	1	5.17
GREEN LANE HAYLING ISLAND CSO - 108769	A01274	SO on sewer network	SZ7135098960	6.37	2	3.52
KINGS ROAD EMSWORTH CSO - 109298	H02829	SO on sewer network	SU7427105341	33.45	6	5.01
LUMLEY ROAD LUMLEY CEO - 108278	A00291	Storm discharge at pumping station	SU7518006240	0.00	0	6.28
THORNHAM FORMULA A CSO - 115370	W00354	Inlet SO at WwTW	SU7582004730	0.00	0	6.04
THORNHAM INLET CEO - 115371	W00354	Inlet SO at WwTW	SU7582004730	3.43	1	6.04
THORNHAM SSO - 115369	W00354	Storm tank at WwTW	SU7582004730	272.55	22	6.04
SCHOOL LANE NUTBOURNE CEO - 108299	A01069	Storm discharge at pumping station	SU7769005390	0.00	0	8.02
PRIORS LEAZE LANE NUTBOURNE CSO - 111267	A01485	SO on sewer network	SU7790005610	334.59	27	8.30
CHIDHAM CEO - 108205	A01248	Storm discharg	SU7931004580	39.56	4	9.31

Site Name	EA Permit	Storm Disc	Outlet NGR	Total Duration (hrs) of spills in 2022	Total Count of Spills in 2022	Distance from centre of nearest CZ
		e at pumping station				
BOSHAM SSO - 115735	W00133	Storm tank at WwTW	SU8088001940	791.30	45	10.60
TAYLORS LANE BOSHAM PUMPED SSO - 116066	A01219	Storm discharge at pumping station	SU8100003760	62.33	6	10.81
OLD PORTSMOUTH ROAD CSO - 111371	NPSWQD000450	Storm discharge at pumping station	SU8348004690	109.63	18	13.41
CHICHESTER WTW 1 SSO - 115402	W00137	Storm tank at WwTW	SU8387003750	1202.07	68	13.66
CHICHESTER WTW 2 SSO - 115401	W00137	Storm tank at WwTW	SU8387003750	84.34	15	13.66

Cefas

EC Regulation 854/2004

CLASSIFICATION OF BIVALVE MOLLUSC PRODUCTION AREAS IN ENGLAND AND WALES

SANITARY SURVEY REPORT

Langstone Harbour

2013

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