Sanitary Survey - Review

The Fleet – 2024

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Document QA and Approval

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Environment Agency (EA)	May 2024
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Consultation on draft report

Consultee	Date of consultation

A sanitary survey relevant to the bivalve mollusc beds in The Fleet 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, Dorset Council. The report is publicly available via the Carcinus Ltd. website.

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Carcinus Ltd., 2024. Review of the The Fleet 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 The Fleet Review

This report reviews information and makes recommendations for a revised sampling plan for existing Pacific oyster *Crassostrea gigas* classification zones in The Fleet (Figure 1.1). This review explores any changes to the main microbiological contamination sources that have taken place since the original sanitary survey was conducted. 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 2024. Responses were received from the Environment Agency and the Local Authority. A kick-off meeting was also held in June 2024, attended by representatives from the LEA, EA, FSA and Carcinus. 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 [DATE]. 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.

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 2024;
- Only information that may impact on the microbial contamination was considered for this review; and
- Official Control monitoring data have been taken directly from the Cefas data hub[1], with no additional verification of the data undertaken. Results up to and including May 2024 have been used within this study. Any subsequent samples have not been included.

[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/.

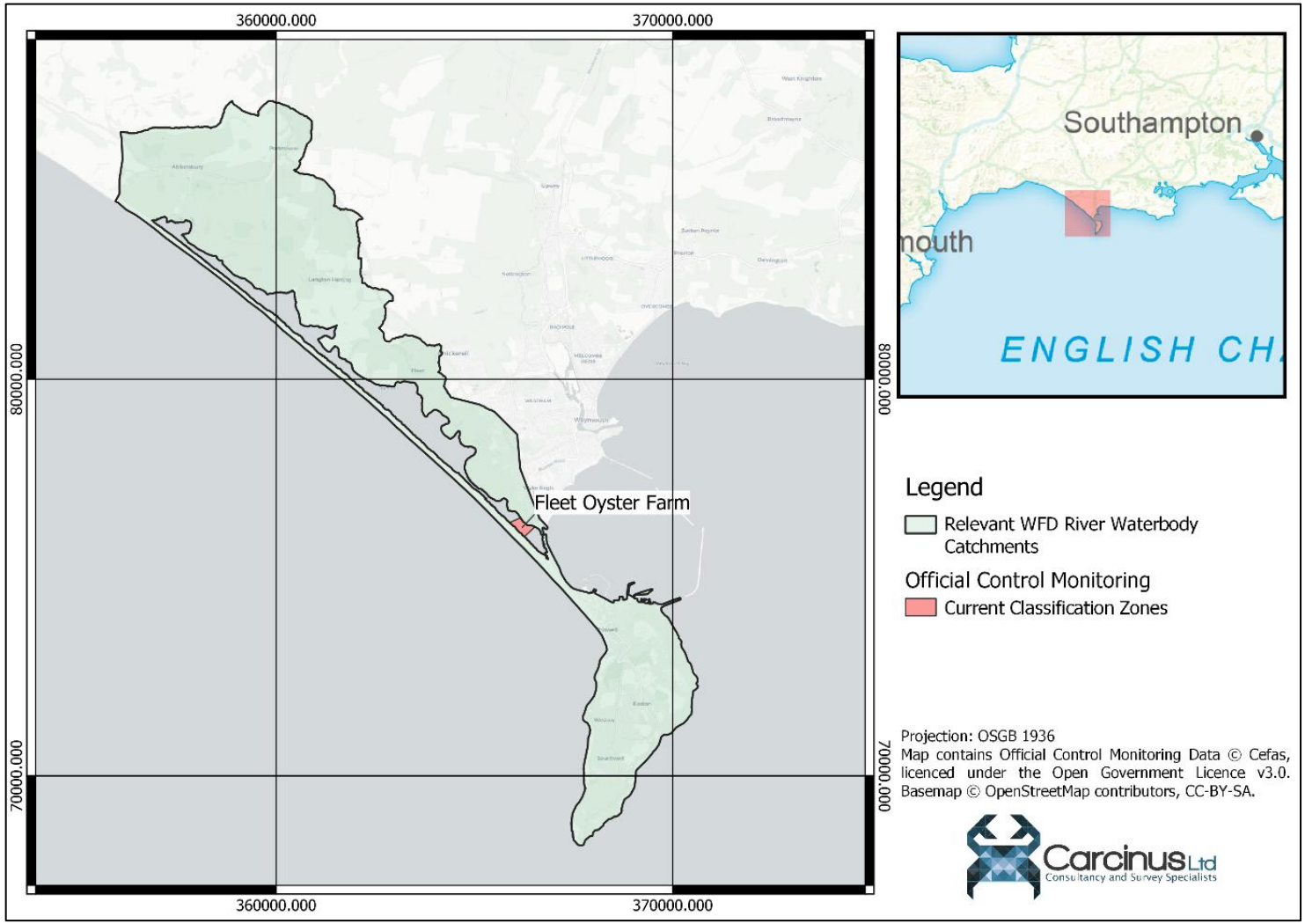


Figure 1.1. Location of The Fleet.

2 Shellfisheries

2.1 Description of Shellfishery

The Fleet is situated on the South Coast of England, to the west of Weymouth (Figure 1.1), hydraulically connected to Portland Harbour at its eastern end (which is itself connected to the English Channel via a narrow space in its breakwater). The Fleet lagoon covers an area of approximately 5 km^2 with large areas of intertidal habitat uncovered at low tide. The lagoon itself lies behind Chesil beach, a large shingle bank which runs all the way from Portland Bill in the south east to West Bay in the north west (29 km). The whole of the Fleet has been designated a Special Site of Scientific Interest (SSSI), a Special Protection Area (SPA) and a Special Area of Conservation (SAC). The majority of the site is also designated as a Ramsar Site and the west Fleet forms part of an Area of Outstanding Natural Beauty (AONB). The closest BMPA is Poole Harbour approximately 30 km to the east (Cefas Site Reference M054). **T**he Chesil Bank and the Fleet Nature Reserve is also an informal reserve managed by a Warden who is appointed by the Ilchester Estates[2].

The Local Enforcement Authority for this fishery for food hygiene official controls (including sampling) is Dorset Council. The original sanitary survey, conducted in 2013, stated native oysters have been harvested from The Fleet since the 15th century, and cited commercial harvesting operations in the 18th and 19th centuries. Few native oysters remain in the area. The Fleet is now a Pacific oyster farm, which has been growing cultured oysters for 40 years.

At the time of writing (June 2024), no consultation response has been received from the Southern Inshore Fisheries and Conservation Authority (C-IFCA), and the authors of this review have no information to suggest that any byelaws associated with the harvesting of oysters from The Fleet BMPA have changed. Given the nature of the site and its various protections (SSSI, SPA, SAC, Ramsar, AONB) fishing of any nature, including shellfish, is highly controlled[3].

The Fleet consists of one Classification Zone (CZ) for the commercial harvesting of Pacific oysters. The area was historically combined with the previous shellfishery in Portland Harbour. The Fleet is now classified as a separate production area. Portland Harbour was declassified as a BMPA in 2022 and is not considered as part of this review.

A summary of the fishery within The Fleet BMPA is provided in the subsequent paragraphs.

2.1.1 Pacific oyster

At the time of the 2013 Sanitary Survey Review (Cefas, 2013) Pacific oysters (*Crassostrea gigas)* were cultured in The Fleet. The classification zone (Fleet Oyster Farm) consisted of a main growing area and a smaller discrete pre-harvest holding area located higher up the

[2] http://www.fleetandchesilreserve.org/managing-the-reserve/

[3] https://secure.toolkitfiles.co.uk/clients/25364/sitedata/Redesign/Conservation/A-Chesil-and-the-Fleet-MPA-FMP.pdf

shore. The CZ continues to be classified for oyster harvesting. Seed is currently sourced from Guernsey approximately twice a year and then grown on for 2-3 years. The oysters are grown in trestles and hand harvested with an approximate commercial landing of 175,000 oysters per year. Most of the cultured oysters go on to be sold in the Crab House Café, who manage the fishery.

2.1.2 Portland Harbour

Some historic Official Control monitoring data is available for mussel, king scallop and Pacific oysters within Portland Harbour. The waters in the now declassified area are hydraulically connected to those of The Fleet BMPA via a small channel under the A354 Bridge at NGR SY667760. In the absence of any other historic monitoring data for the Fleet BMPA itself it is considered appropriate to include this data from Pacific Oysters within Section 6 of this review to enable some comparison. Since the CZs within the Portland Harbour are no longer classified for commercial harvesting having been declassified in 2022, an assessment of the pollution sources within catchment draining to Portland Harbour is outside the scope of this review.

2.2 Classification History

The 2013 Sanitary Survey report identified the Fleet Oyster Farm classification zone for Pacific oysters (class B). This is currently still the only active classification zone in The Fleet and is classified B-Long term (B-LT). The CZ was awarded class B-LT from 2016 to 2019 and was subsequently upgraded to Class A in 2020 before reclassification as Class B long-term in 2021.

The location and classification status of the active CZ, along with the respective monitoring point (RMP) for official control monitoring and its current status since 2013 is presented in Table 2.1 and Figure 2.1. The location of the RMP has not changed since 2013.

Table 2.1 Summary of all active Classification Zones in The Fleet BMPA.

Classification Zone	Classification Zone coordinates	Species	Current Classification (as of May 2024)	RMP
Fleet Oyster Farm	50° 35.240'N 02° 28.763'W 50° 35.117'N 02° 28.448'W 50° 34.981'N 02° 28.675'W 50° 35.174'N 02° 28.991'W	Pacific oyster	B-LT	Fleet Oysters (C. gi) B25AI 50° 35.116'N 02°28.5'W

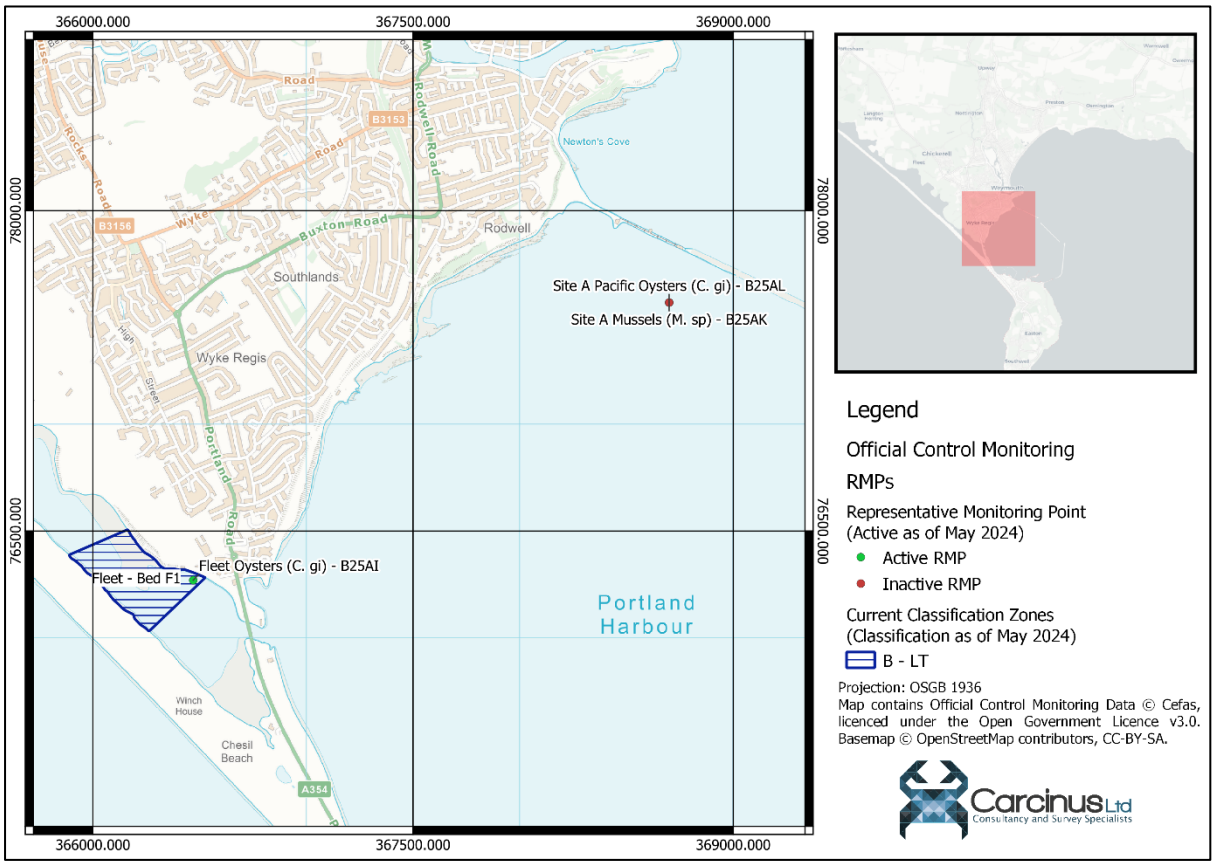


Figure 2.1 Current Classification Zone and the associated Representative Monitoring Point. (RMP B25AI). RMPs for the declassified zones within Portland Harbour (B25AL and B25AK) are included in this map as they are used to provide additional monitoring context in Section 6.

Table 2.2 Classification history of active Classification Zones within the Fleet BMPA.

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Classification of *Fleet Oyster Farm*	B-LT	B-LT	B-LT	B-LT	B-LT	B-LT	B-LT	A	A	B-LT	B-LT

3 Pollution sources

3.1 Human Population

The 2013 Sanitary survey report cites population data based on the 2011 Census of the United Kingdom. A subsequent census was conducted in March 2021 and so the results of the two censuses have been compared to give an indication in the changes in human population within The Fleet Catchment. The catchment used in this review is larger in terms of area than that of the 2013 report, as it includes the Isle of Portland (which may contribute contamination to Portland Harbour and therefore The Fleet).

Figure 3.1 shows the human population density (persons per square kilometre) in Census Output Areas wholly or partially contained within the Fleet Catchment at the 2011 and 2021 Censuses. It shows the main urban fabric areas across the catchment have remained similar to those shown in the 2013 sanitary survey report, and are concentrated around the main harbours of Portland and Weymouth. Wyke Regis is a smaller settlement directly adjacent to The Fleet oyster farm and has a high population density of around 5,000 persons per quare kilometre. Toward the north of the catchment, it becomes more rural with population densities of less than 400 persons per square kilometre. In 2011, the population in the catchment in Figure 3.1 was 72,267. In 2021, the population had increased by 5.5% to 76,290.

A desk-based assessment of planning portals, literature, and satellite imagery shows areas within the catchment are currently undergoing substantial development. In particular, the area of Chickerell to the north of Wyke Regis is subject to large-scale new-build housing estate development (292 new homes at Chesil Reach, Chickerell)[4], with more plans under review for further housing[5] (Dorset Council, no date). Given the proximity of these settlements to the CZ, the risk of urban associated runoff has a high potential. However, the CZ is approximately 4 km (straight line distance) from Chickerell and so significant bacteriological die-off is likely before contamination reaches the shellfish waters. In addition, housing developments also have the potential to increase loading to the existing wastewater treatment network. At initial consultation, the LA did not express any concern for the capability of the wastewater treatment network to handle this increase.

Between Chickerell and Wyke Regis is the Granby Industrial Estate. This 30-acre site comprises a comprehensive road network with multiple commercial lettings to local, national and international businesses[6]. The estate is approximately 2.5 km from the CZ boundary, and the risk of both bacteriological and chemical contamination is potentially high. Some dilution to contamination is likely to occur before it reaches the CZ given the

[4] https://www.newhomesforsale.co.uk/new-homes/dorset/chickerell/chesil-reach-cg-fry-son/
[5] https://www.dorsetecho.co.uk/news/18898302.residents-fury-area-destructed-development-see-500-houses-built/
[6] https://www.djproperty.com/locations/granby-industrial-estate/

distance, however further information is sought from the Environment Agency with regards to the treatment of wastewater and possible chemical waste from this site.

Dorset is one of the top ten holiday destinations in the UK, and each year sees an average of 1.6 million overnight visitors, and 2.6 million day visitors[7]. Tourism is usually seasonal with more visitors likely in the summer months. The peak population in the catchment is likely to occur between June – September and will result in increased loading to the wastewater treatment network. The 2013 sanitary survey report stated there are five holiday and caravan parks along the Fleet (the closest is approximately 6 km from the CZ boundary) which will potentially increase the amount of sewage discharged through private discharges in the catchment, particularly during the summer. During initial consultations, the LEA had no concerns over the adequacy of the network to handle the seasonal increase. Further information on the wastewater network can be found in section 3.2.

Analysis of Census data shows that there has been a 5.5 % increase in populations between 2011 and 2021. The main urban areas identified in the 2013 report as most likely to affect the BMPA have remained the same. The area continues to be a popular tourist destination with 2.6 million day visitors and 1.6 million overnight visitors on average each year. Overall, the recommendations made in the 2013 Sanitary Survey Review to account for the impact of human populations remains valid.

[7] https://www.weymouthtowncouncil.gov.uk/wp-content/uploads/2022/08/Corporate-Plan-0822-refresh.pdf

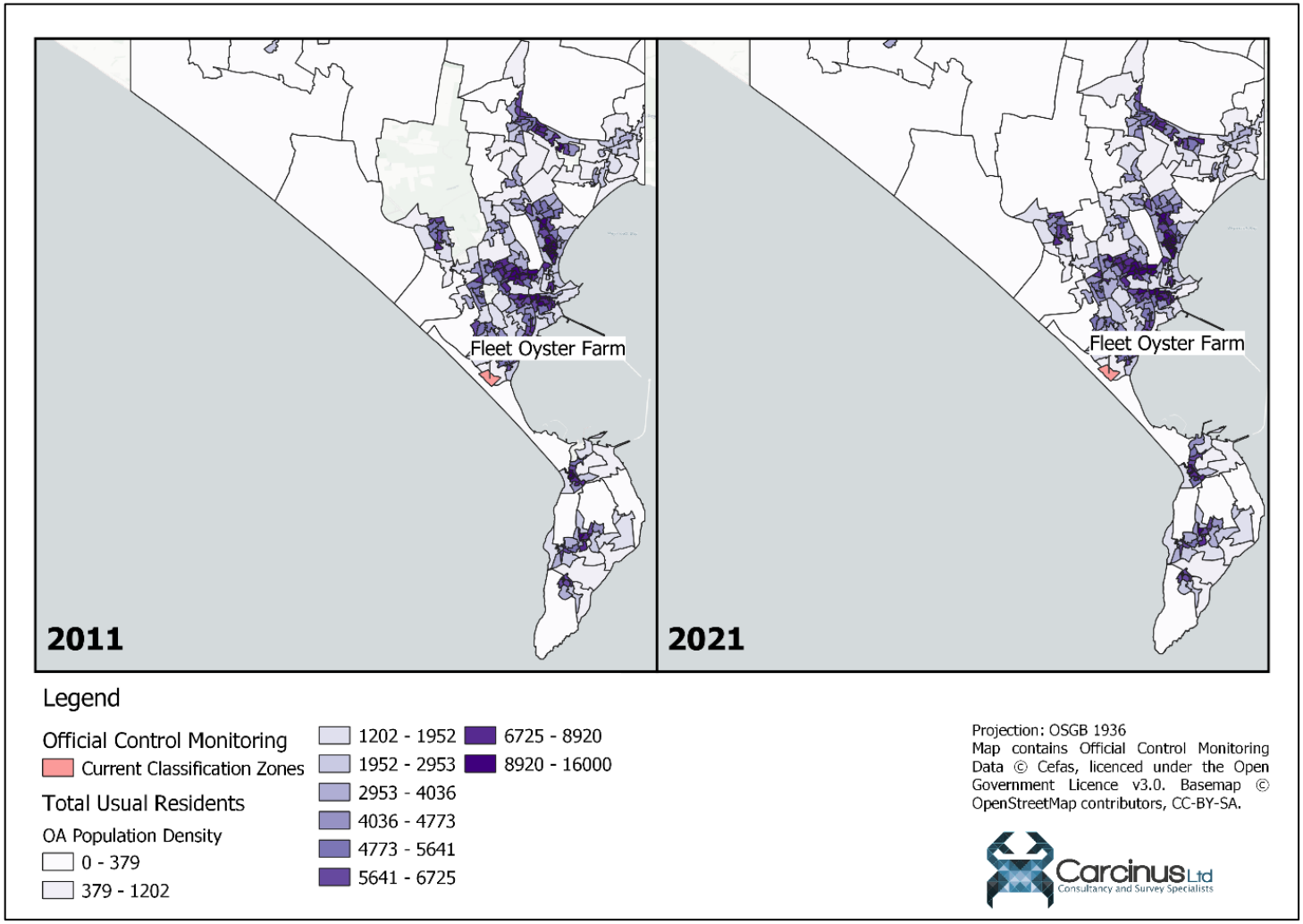


Figure 3.1 Human population density (persons per square kilometre) in Census Output Areas wholly or partially contained within The Fleet catchment at the 2011 and 2021 Censuses.

3.2 Sewage

Details of all consented discharges in the vicinity of The Fleet BMPA were taken from the most recent update to the Environment Agency's national permit database at the time of writing (February 2024 Update). The locations of these discharges within the catchment are shown in Figure 3.2 and near the Classification Zone are shown in Figure 3.3. Please note, discharges within close proximity of one another will be represented by one number at that location. Please refer to Appendix I where grid references are available for all discharges.

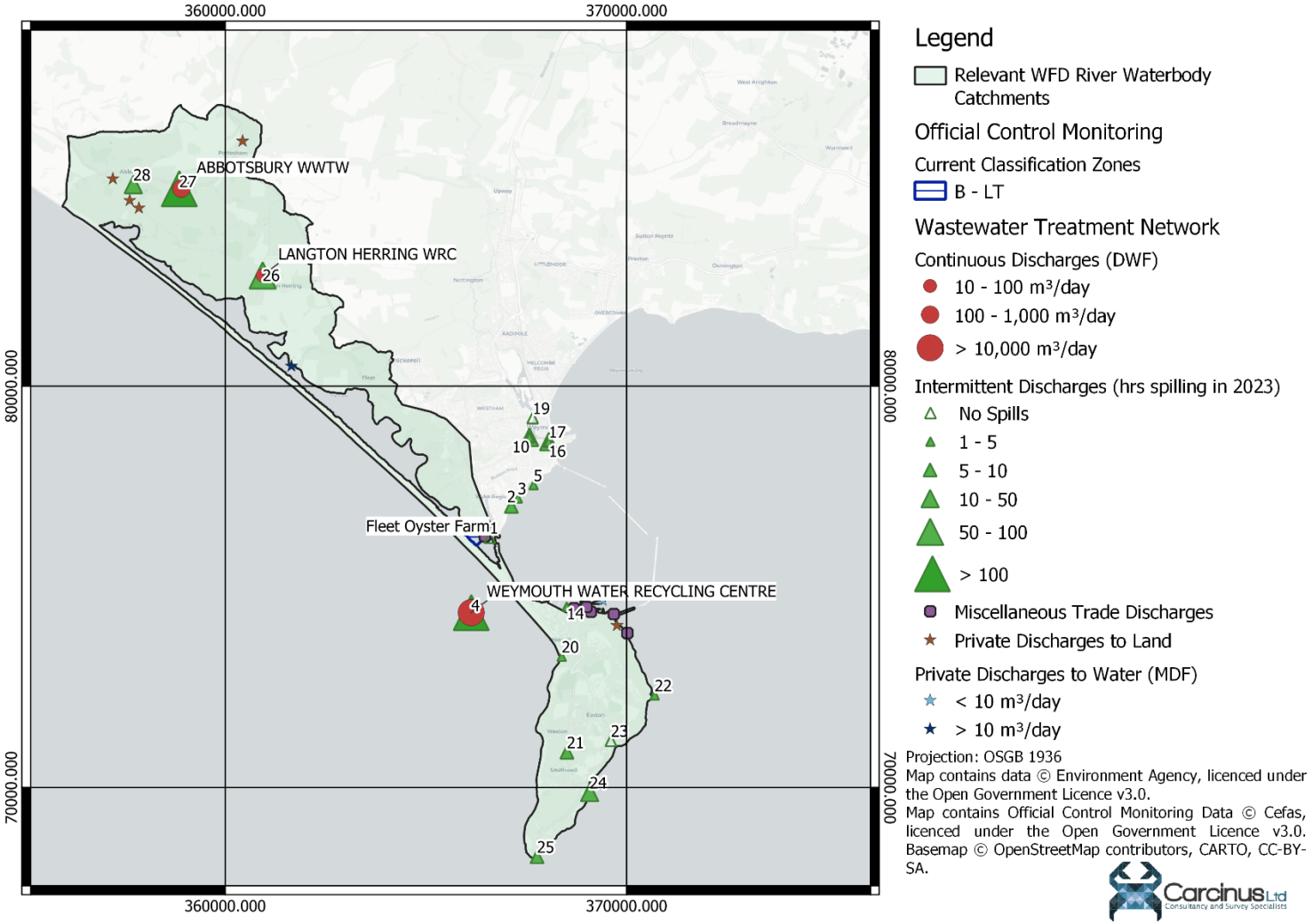


Figure 3.2 Location of all consented discharges in The Fleet Catchment. Details of consented discharges are shown in Table 3.1. Intermittent discharges are labelled in ascending order of distance from the CZ.

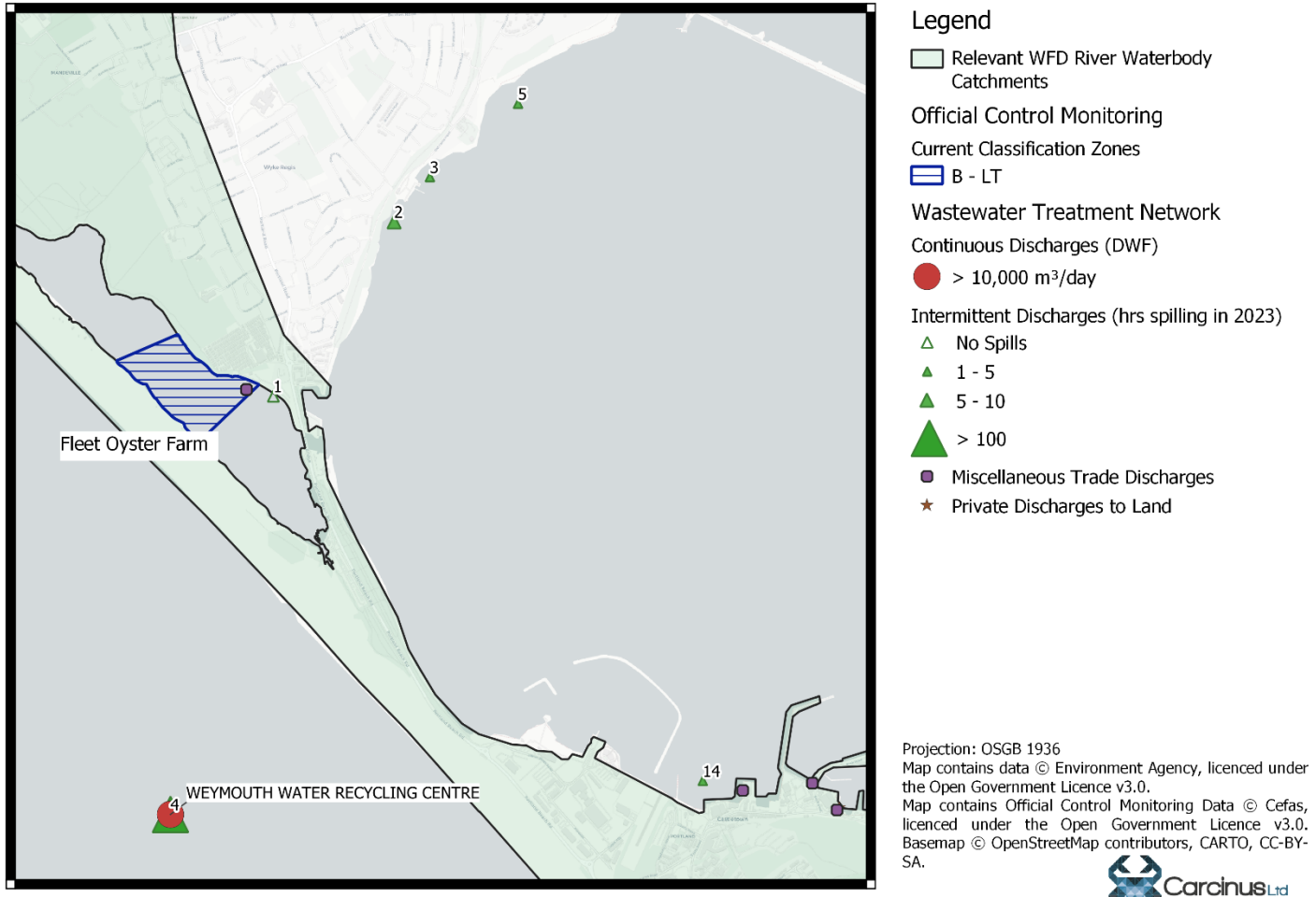


Figure 3.3 Location of the closest discharges to the BMPA.

Table 3.1 Details of continuous discharges within the vicinity of The Fleet BMPA. New discharges identified in this review are highlighted in yellow.

Discharge Name	Permit Number	Receiving Water	Outlet NGR	Treatment Methodology	Year EDM Installed	DWF (m^3/day)	Distance (km) from centre of nearest CZ[8]
ABBOTSBURY WWTW	040001	ABBOTSBURY BROOK	SY5890684921	CHEMICAL - PHOSPHATE STRIPPING	2017	300	11.33
LANGTON HERRING WRC	040049	TRIBUTARY OF WEST FLEET	SY6093382762	BIOLOGICAL FILTRATION	2020	40	8.37
WEYMOUTH WATER RECYCLING CENTRE	400622	(C) ENGLISH CHANNEL	SY6613074360	BIOLOGICAL FILTRATION	2019	32,141	1.91

[8] Distance based on location of asset shown in Figure 3.2 to centre of nearest CZ.

The 2013 sanitary survey report identified two continuous discharges in the vicinity of The Fleet BMPA; Abbotsbury WwTW and Langton WRC. Both of these discharges remain active and have seen no changes to their consented discharge volume (Table 3.1). In the previous sanitary survey, Abbotsbury WWTW was treated by biological filtration. It now undergoes phosphate stripping, a type of chemical treatment. The 2021 Shellfish Action Plan for the Fleet states no improvements have been made to these two continuous discharges to date.

An additional continuous discharge has been identified in this review, the Weymouth Water Recycling Centre (WRC). This discharge is located 1.91 km from The Fleet BMPA. It has a high Dry Weather Flow (DWF) volume of 32,141 m^3/day and employs biological treatment. The offshore location of this discharge means tidal flow through this area will allow for water mixing and dilution of potential contamination. Seawater from the English channel is known to percolate through the pebbles of Chesil Beach (Robinson, 1983), potentially carrying some contamination from the Weymouth WRC into the BMPA. Furthermore, during very stormy weather seawater may overtop Chesil beach. This discharge requires consideration in any updated sampling plan given its high consented DWF. See section 4 for more details on water circulation.

In addition to the continuous discharges within the catchment, the 2013 Sanitary Survey report identified a number of intermittent discharges with the potential to impact the bacteriological health of the BMPA. Intermittent discharges comprise Combined Storm Overflows (CSOs), Storm Tank Overflows (STOs), Pumping Station Emergency Overflows (PSs), and Sewer Pumping Stations (SPSs). There are five intermittent discharges within 2 km of the BMPA. A summary of the EDM return for discharges in the vicinity of the Fleet BMPA is presented in Appendix I, with ID numbers showing distance of discharge from CZ in ascending order.

The closest intermittent discharge to the CZ is Ferrybridge PS which discharges directly into the Fleet. EDM was installed on this PS in 2016 and has reported 0 spills for 0 hours in 2023, 2022, 2021, and 2020. The 2013 sanitary survey report similarly found this discharge to be closest in proximity, and to spill “infrequently”(suggesting the discharge is less active than it used to be, and therefore less of a risk with regard to bacteriological contamination levels within the BMPA). There are three discharges within close proximity to the Fleet CZ located in Portland Harbour. Rear Doncaster Road is 1.18 km from the CZ and spilled 11 times for a duration of 8.52 hours in 2023. In 2020 this discharge spilled 5 times for 2.83 hours, in 2021 it spilled 6 times for 1.16 hours, and in 2022 it spilled 6 times for 5.29 hours. Hillcrest Road PS is 1.43 km from the CZ and spilled 4 times for a total duration of 1.75 hours in 2023. It spilled 0 times for a total duration of 0 hours in 2020, 2021, and 2022. Castle Cove PS is 1.94 km from the CZ, and spilled 5 times for 4.15 hours in 2023. It spilled 0 times for 0 hours in 2020, 1 time for 0.25 hours in 2021, and 1 time for 0.25 hours in 2022. The Castle Cove PS, Rear Doncaster Road, and Hillcrest Road PS discharges are all located in Portland Harbour, and so the flooding tide may carry some contamination into The Fleet. Although they have relatively low spills counts and duration, they should be taken into consideration in any updated sampling plan. The Weymouth Water Recycling Centre is 1.91 km from the CZ and

is offshore discharging directly into the sea to the south of the CZ. EDM was installed in 2019. It spilled 90 times for a total of 424 hrs in 2023. In 2021, it spilled 66 times for a total of 226.75 hours and in 2022, it spilled 59 times for a total duration of 345.5 hours. Given this discharge's offshore location, the mixing of water surrounding it into the lagoon where The Fleet BMPA is located is limited. However, in stormy weather conditions, wave action could force water over Chesil beach and into the Fleet lagoon. Contamination from this source should be considered in any updated sampling plan. There are also some small discharges within the River Wey, and so the mouth of that river is considered a point source of contamination.

There are 15 additional intermittent discharges between 2 – 5 km from the CZ. The majority of these have low spill counts (< 10 number of spills) and durations (< 10 hours). Those which exceed this are The Marsh CSO (9 times for 24.4 hours in 2023, ID 11), Admiral Hardy CSO (8 times for 24.36 hours in 2023, ID 6), Chickerell Road CSO (41 times for 14.6 hours in 2023, ID 8), and Chickerell Boys Club CSO (22 times for 5.36 hours in 2023, ID 7). These discharges are all 2.82 km from the CZ in Portland Harbour, and grouped close together (Figure 3.2). The Rodwell Avenue CSO (ID 15) is 3 km away from the CZ and spilled 55 times for a duration of 46.83 hours in 2023. It is in close proximity to the discharges named previously. The accumulation of bacteria from all these discharges being carried on a flooding tide from Portland Harbour into the Fleet means they should be considered in any updated sampling plan.

Since the 2013 Sanitary Survey was published, there have been some improvements to the Wastewater Treatment Network. EDM was installed at Langton Herring STW in 2022 during AMP7. This intermittent discharge is more than 8 km from the CZ and so does not need consideration in this report as significant water mixing will occur before contamination reaches the CZ. In addition, in 2017 Wessex Water (the water company for the southwest) investigated the performance of Abbotsbury STW and Langton Herring STW taking summer and winter bacteriological samples, including microbial source tracking. Abbotsbury SPS and Ferrybridge SPS storm discharges were also assessed. The investigation concluded that the water company assets operating in the area are performing as expected, within the limits of their consents, and are not significantly affecting water quality in The Fleet shellfish water . Spills from Abbotsbury SPS were infrequent and of short duration and Ferry Bridge PS has not spilled within the 10 years that the site has been monitored. No improvements were required or recommended as a result of the investigation. At initial consultation the EA stated there are no shellfish obligations identified for AMP8; however, there are planned investigations in the Water Industry National Environment Programme (WINEP). Wessex Water are currently drafting this. The complete agreed WINEP will not be available until after Ofwat has made its final PR24 determination of water company business plans in December 2024, after this report is published.

In addition to the water company owned infrastructure, there continue to be many privately owned discharges throughout the catchment as reported in the 2013 Sanitary survey report. Some of these discharge to watercourses (one discharges to the Fleet) and some to

soakaway/groundwater. For those that discharge to water, these are generally treated by biological filtration. The majority of these are small and serve only one or two properties. Limited details of these private discharges can be provided due to data protection requirements. All reported private discharges to water are more than 3 km from the CZ. All reported private discharges to land are more than 11 km from the CZ. Therefore, neither of these private discharge types present significant risk of contamination to the shellfish waters. At initial consultation, the EA noted a Private discharge at the Moonfleet Manor Hotel in the catchment (6 km from CZ). The effluent is discharged to the lagoon via a small reed bed, and undergoes secondary treatment. A new permit was issued in 2021 with tighter consent limits than previously. There has been no significant upgrade to treatment since the last sanitary survey, and the discharge is < 50 m^3 a day. This discharge does not need further consideration in any updated sampling plan as it has a low DWF and is > 5 km from the BMPA.

There are also a number of miscellaneous trade discharges situated throughout the catchment. The discharge closest to the BMPA is discharging to east Fleet within the CZ itself. The flow volume is low (< 10 m^3 / day) and so generally poses little risk to contamination in the BMPA. In addition, the lagoon environment in which the BMPA is located provides ample opportunity for water mixing, with strong tidal currents (see section 4). Miscellaneous discharges do not need to be considered in any updated sampling plan.

The Shellfish Action Plan assesses water company assets as a 'medium'[9] risk source of point contamination. At initial consultation, the EA shared it is currently drafting/scoping a Diffuse Water Pollution Plan (DWPP). A Site Improvement Plan (SIP) for Chesil Beach and The Fleet[10] was published in 2018 as part of the Improvement Programme for England's Natura 2000 Sites (Natural England led), with water pollution identified as a "Pressure/Threat" (namely excess nutrient levels and sediment loads due to intensive farming practices and sewage treatment work discharges). The mitigation measure in place is to implement the Diffuse Water Pollution Plan and Dorset Clearance Plan. These works are led by Natural England, alongside the EA.

There are 3 continuous discharges within the catchment, and of greatest concern in terms of BMPA health is the Weymouth Water recycling centre (discharging 1.91 km from the CZ). This continuous discharge is located offshore and so tidal flow will provide mixing of waters to dilute contamination. However, this asset has a high consented discharge volume, and during stormy weather, contamination from the Weymouth Water Recycling centre could enter the BMPA over Chesil Beach, as well as via percolation through the pebbles of Chesil Beach. Therefore, it should be considered in any updated sampling plan. There are 5 intermittent discharges within 2 km of the CZ. The closest at Ferrybridge discharges directly into the Fleet lagoon, however, it has not spilled for a number of years. The intermittent

[9] M - Medium contribution (10% to 39%)
[10] https://publications.naturalengland.org.uk/file/5730023478919168

discharge at Weymouth Water Recycling Centre should be given the same consideration as above; although it is offshore, it has a high spill count and duration therefore some contamination from this source may enter the Fleet over/through Chesil Beach. The remaining 3 discharges within 2 km of the CZ are located in Portland Harbour, but the flooding tide may carry some contamination into The Fleet. Although they have relatively low spills counts and duration, they should be taken into consideration in any updated sampling plan. A number of discharges are between 2-5 km from the CZ. Whilst most have low spill counts and durations, the accumulation of bacteria from a small cluster of discharges between 2.8 km – 3 km from the CZ in Portland Harbour has been identified as needing consideration in any updated sampling plan. Private discharges are all > 3 km from the BMPA and so pose little risk in terms of contamination. There is one miscellaneous discharge located within close proximity to the CZ, flowing into east Fleet. Flow is low at this point source, and the lagoon environment of the BMPA means strong tidal currents and water mixing will dilute any potential contamination.

3.3 Agricultural Sources

The 2013 Sanitary survey report cites livestock data for The Fleet based on the 2010 Livestock Census. To provide an indication of changes in the livestock population of the catchment, a data request was made to the Farming Statistics Office for the Department of Environment, Food and Rural Affairs (DEFRA) for livestock populations within the catchment presented in Figure 1.1 for 2016 and 2021 based on the June Survey of Agriculture and Horticulture[11]. The data could not be broken down into the various sub catchments to prevent disclosure of information about individual holdings. Figure 3.4 presents the changes in livestock populations within the Fleet catchment.

[11] 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.

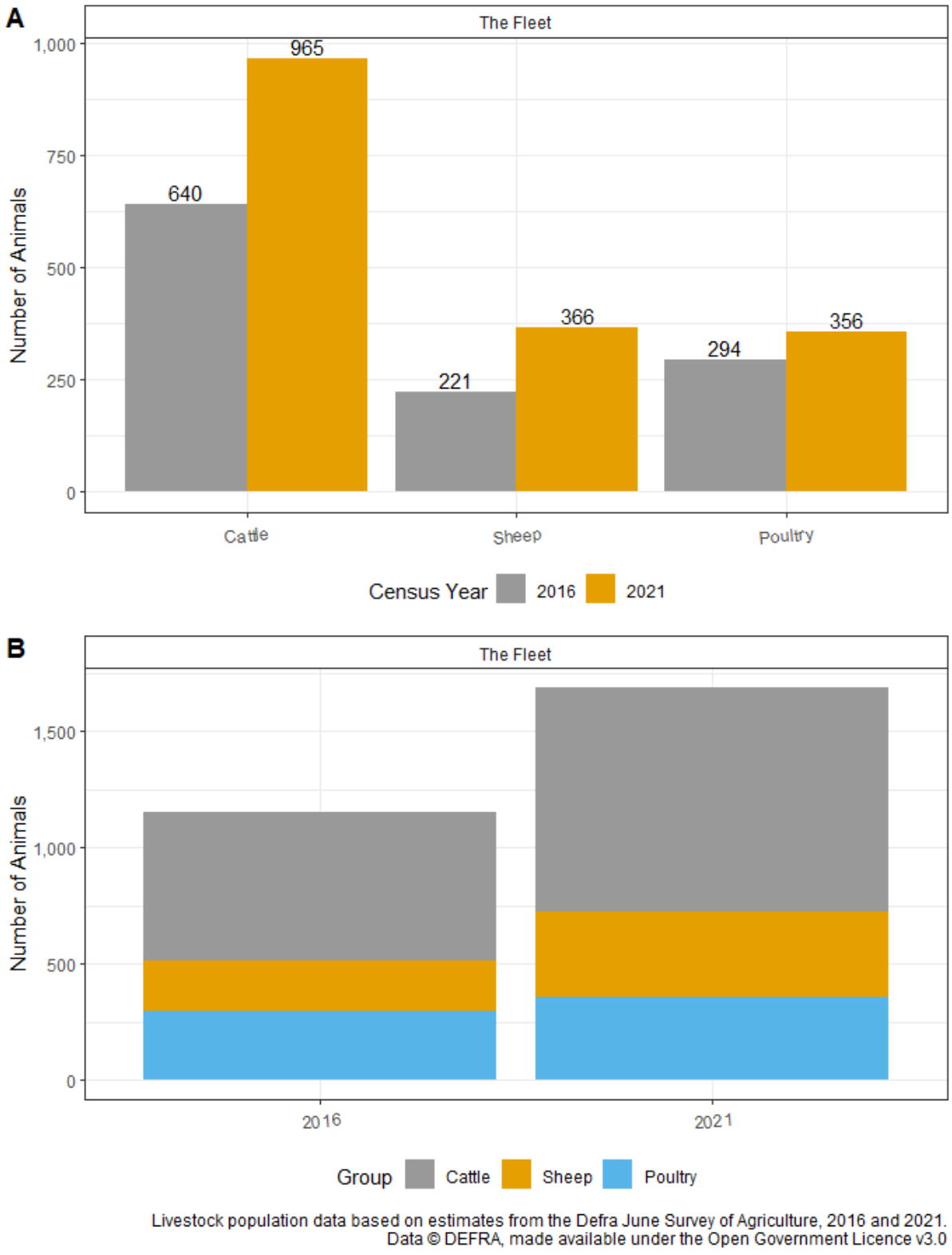


Figure 3.4 Changes in livestock populations in The Fleet catchment between 2016 and 2021.

The data presented in Figure 3.4 show that between 2016 and 2021 the number of cattle in the wider catchment increased by 50.7 %, sheep by 65.6 %, and poultry by 21.1 %. In both years, cattle was the largest group in the catchment. It should be noted that the June Survey

of Agriculture and Horticulture presents a snapshot of population sizes at one point in a year, but the actual numbers 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 land cover of The Fleet catchment in 2012 and 2018[12] is shown in Figure 3.5. The maps show that the majority of the catchment is agricultural and areas surrounding the BMPA are urban fabric, with a small amount of pasture directly behind the *Fleet Oyster Farm* CZ. Generally, the land cover has remained similar between the two years, despite the increase in animal populations. 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, particularly following significant rainfall events. No rivers flow directly into The Fleet, however several small streams drain into the Fleet lagoon in the upper end of the catchment.

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. In theory, these legislative changes should have reduced the pollution that this activity causes to shellfish CZs since the previous 2013 sanitary survey report.

Following initial consultation, further information was shared by the EA for agricultural elements of the DWPP developed by Natural England and the EA, mentioned in the previous Sewage section. The Agricultural Team in Wessex are responsible for regulating the Agricultural Sector across Wessex, which includes the Fleet Catchment discussed in this report. They do this on a risk-based approach targeted in two ways: a reactive farm

[12] Most recent publicly available data.

inspection following a pollution incident, or a planned programme of inspections, targeted at specific catchments that contain sensitive receptors or declining water quality. To support the development of the DWPP, the agricultural team are currently focusing on the farming activities across the Fleet catchment. Compliance inspections will be conducted across the land holdings within the catchment to assess the baseline compliance as it stands under the current regulations. This is ongoing, so there is no output from this work yet, however this is likely to be reported on later in the year.

The Action Plan for The Fleet Shellfish water assesses that agricultural contamination has a 'high'[13] contribution to contamination levels in the area. The primary agricultural land type reported in the plan is arable and pasture, and much of the land draining to the middle and western end of the lagoon where The Fleet BMPA is located near land owned and managed by a private estate. The previous sanitary survey states the geology of the catchment suggests permeability of soil is variable and that land bordering the middle and upper reaches of the lagoon where permeability is high may produce significant groundwater flows. During and after periods of heavy rainfall, runoff from agricultural areas will be greatly increased. During initial consultations, concerns were raised suggesting higher monitoring results in Autumn months is due to greater rainfall and therefore more agricultural land runoff. This is further discussed in Section 5 and 6.1.3. The Shellfish Water Action Plan for the Fleet provides details of a partnership between Natural England and the EA as part of the Catchment Sensitive Farming (CSF) initiative. This aims to improve understanding of pollution issues and identify farmers who can work with them to enhance farming practices and reduce run off from farmland. The catchment was classified as High Priority under Phase 4 of CSF which was funded by Defra from April 2016 to March 2021. As of 2021, the CSF initiative continued to operate in the catchment funded by DEFRA, and is therefore likely to have resulted in improvements to farming and runoff to shellfish waters for this 2024 review.

Livestock numbers in the catchment have increased since 2016; the number of cattle in the wider catchment increased by 50.7 %, sheep by 65.6 %, and poultry by 21.1 %. The land use in the catchment has remained broadly similar since the 2013 Sanitary Survey with areas of urban fabric and pasture surrounding the CZ. A shoreline survey would be beneficial to this assessment to gather more information on the use of farmland close to the CZ, and estimate populations of livestock in the areas adjacent to the BMPA (should sufficient information on these sources of contamination not be available following secondary consultation). Contamination from agricultural sources should be considered in any updated sampling plan.

[13] H - High contribution (>40%)

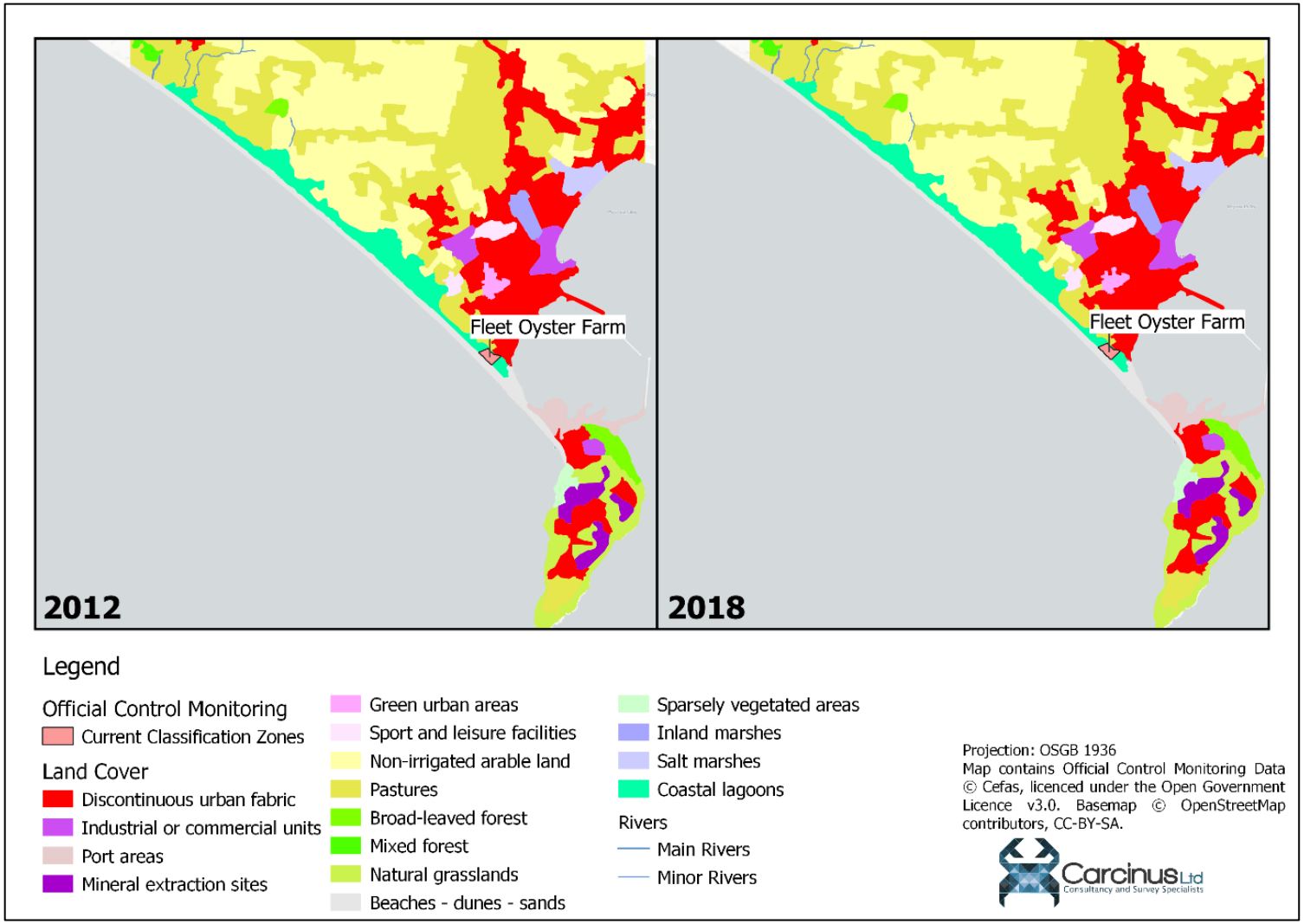


Figure 3.5 Land cover in The Fleet catchment in 2012 and 2018.

3.4 Wildlife

Overwintering and wading birds often represent a potentially significant source of microbiological contamination to shellfisheries because avian species frequently forage (and therefore defecate) in shellfish harvesting areas. The Fleet features a variety of habitats including a large beach, saltmarsh, eelgrass beds, and intertidal flats. All of these attract significant populations of wildlife including large numbers of internationally and nationally important species of birds (Brent Goose – international; Mute Swan – international; Shoveler – national; Pintail – international; Pochard – national; Red-breasted Merganser – national). Consequently, the whole of the Fleet has been designated as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Special Area of Conservation (SAC). It has also been designated as a Ramsar site, a Nature Reserve and the west Fleet forms part of an Area of Outstanding Natural Beauty (AONB).

Figure 3.6 shows the temporal trend in total overwintering waterbird counts from the winter of 1965/66 to 2022/23 (the most recent for which data are available). It shows that the dominant group in terms of population size are wildfowl, with small populations of other groups throughout. In the five winters to 2022/23, an average of 12,949 waterbirds were found (Austin *et al.*, 2023). This value is a decrease of 22.6 % on the five winters to 2010/11 reported in the previous sanitary survey report. Different bird species will forage and therefore defecate in different areas across the Fleet due to its varying habitat types. It is possible that some species will be attracted to the oyster trestles and rest directly upon them, therefore defecating directly into the CZ (Marine Institute, 2012). The largest aggregations of waterbirds, and therefore the highest risk of contamination due to defecation, 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. The precise timing and locations of the contamination will however be variable. Although it is challenging to define RMPs which reliably capture this source of pollution, it is likely the presence of birds will contribute to background levels of faecal pollution in the Fleet. The situation has not changed since the original sanitary survey was published and waterbird counts do not need consideration in placement of the RMP.

The 2013 Sanitary survey report identifies no major seal colonies in the vicinity of the Fleet lagoon. The closest is the Solent (approximately 80 km away). Marine mammals have been sighted in the area, and may also contribute some contamination, particularly when foraging (White and Webb, 1995). However, the area is not considered to be a significant habitat for these groups and so any contamination will be occasional and minimal and does not need to be taken into consideration in the placement of RMPs for this BMPA.

The 2021 Shellfish Action Plan assesses animals and birds to have a ‘low’ contribution to contamination in the BMPA as a diffuse source. Whilst there are high numbers of birds in the Fleet and Wey, capturing this source of contamination is difficult given the spatial and temporal variability. The effects of wildlife do not need consideration in the placement of any RMP, and the recommendations of the 2013 report remain valid.

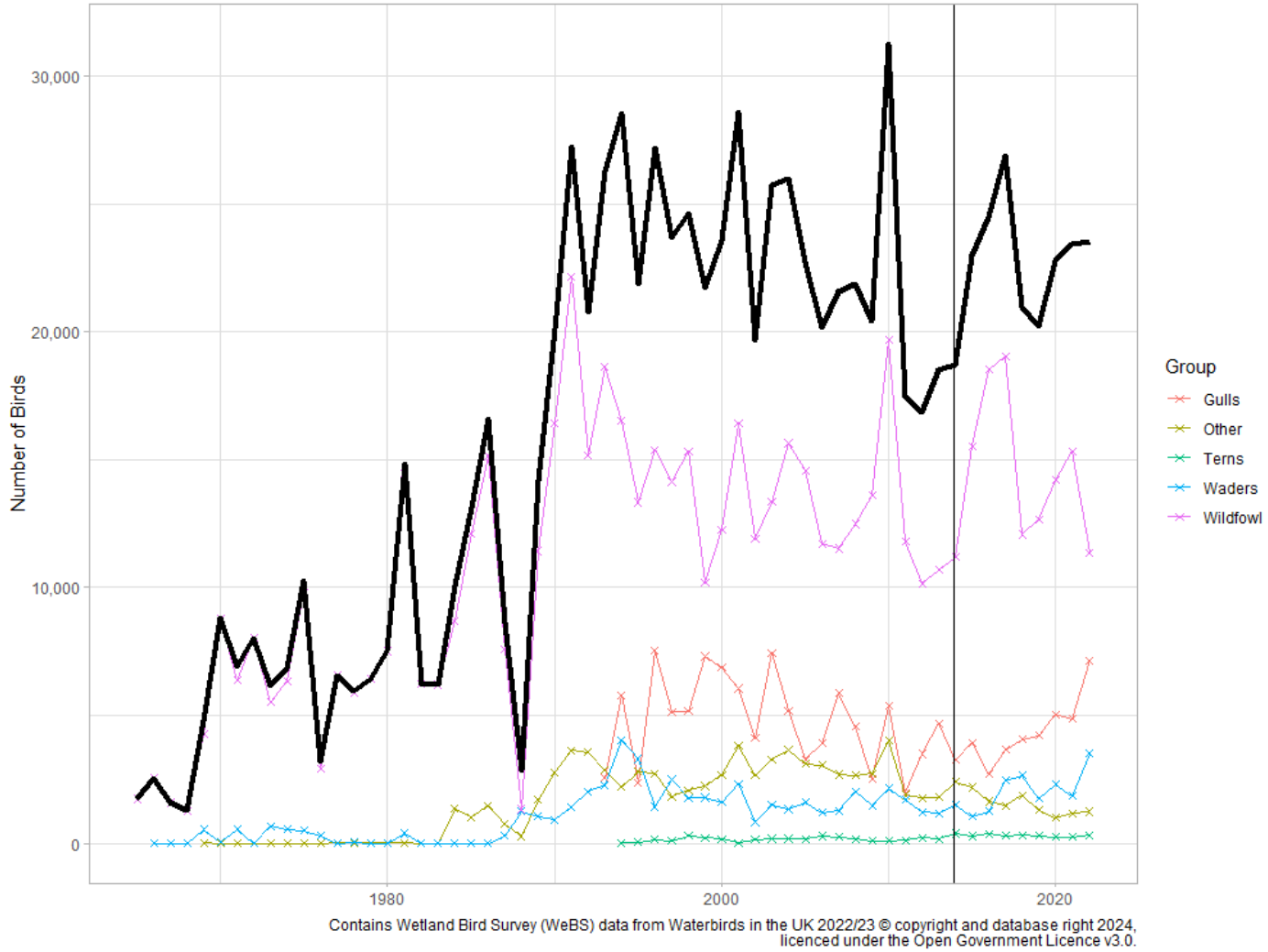


Figure 3.6 Temporal trend in waterbird counts from Fleet and Wey. Data from the Wetland Bird Survey (Austin et al.*, 2023). Black line indicates total number of birds.*

3.5 Boats and Marinas

The discharge of sewage from boats is a potentially significant source of contamination to The Fleet BMPA. Although boating activities in the Fleet lagoon itself are limited, the 2013 sanitary survey report identified significant boat traffic in Portland Harbour to which the Fleet is connected. 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 report. Their geographical positions are shown in Figure 3.7.

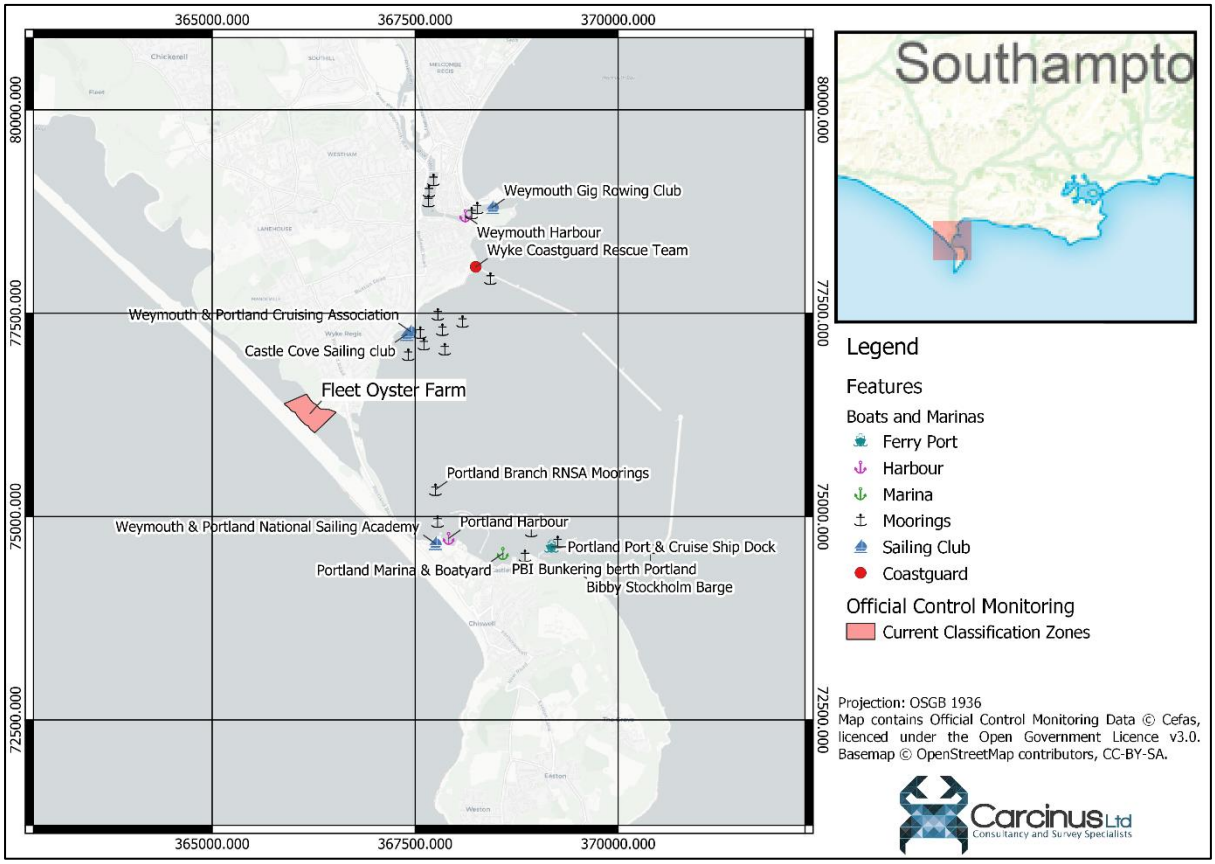


Figure 3.7 Locations of boats, marinas and other boating activities in the vicinity of The Fleet BMPA.

Portland port sits at the southern end of Portland Harbour (Figure 3.7). Portland harbour is the second largest man-made harbour in the world. This port has 12 berths for vessels up to 300 m length, and receives traffic carrying a variety of freight, from hazardous materials to agribulks[14]. The port is a popular cruise port with approximately 11 cruise ships docking in the harbour each year[15]. As of 1 June 2024, 11 fishing vessels under 10 m in overall length list Portland as their home port (gov.uk, 2024). No vessels over 10 m in length list Portland

[14] https://www.portland-port.co.uk/cargo
[15] https://www.portland-port.co.uk/Cruise

as their home port. As of June 2024, a further 25 fishing vessels under 10 m and 3 vessels over 10 m in overall length list Weymouth Harbour, approximately 1.3 km north-west of the shellfishery, as their home port.

In addition to the commercial shipping traffic, there is a significant volume of recreational boating activity near the BMPA. Portland Marina and Boatyard, 1.3 km west of the commercial port, has space for more than 400 vessels (Boatshed, 2018). A number of visitor moorings are also present. Additionally, Weymouth Harbour has space for a further 400 vessels, and can accommodate craft up to 20 m length (Weymouth Harbour, 2024). The closest pump out facilities are in Poole Quay Boat Haven and so recreational vessels of a sufficient size to contain onboard toilets are likely to make overboard discharges from time to time, particularly when moving through the main navigational channels or when moored overnight. The greatest impacts are likely to occur in summer months, when vessel numbers are at their highest, but it is impossible to accurately predict the timing or volumes of any contamination.

No significant changes to the extent of boating activity within the Fleet catchment have occurred since the 2013 Sanitary Survey report was published, and no update to the sampling plan is necessary on this basis.

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. To date, the EA have not carried out any misconnection work in the Fleet catchment.

There is likely to be a minor impact associated with dog fouling along coastal paths and beaches, but this is not expected to be a significant source of contamination. Dog walking is likely to take places on beaches and intertidal areas in the catchment, and therefore could represent a diffuse source of contamination to the BMPA. The intensity of dog walking is likely to be higher in both urban areas, and during the summer months. However, as a diffuse source, it is unlikely to have influence on contamination in the shellfishery and the recommendations in the 2013 report remain valid.

The 2021 Shellfish Water Action Plan identifies a significant area of military firing range directly adjacent to the shellfish waters. It is approximately 2.8 km from the CZ. At initial consultation, information was shared stating the site is predominantly used for water-based training, and the military base ‘Chickerell Camp’ is connected to the main sewer system. It is not commonly used and there are no concerns regarding microbiological or inorganic contaminants. Therefore, it does not require consideration in any updated sampling plan (unless information gained during secondary consultation suggests otherwise).

4 Hydrodynamics/Water Circulation

The Fleet is a shallow 13 km long coastal lagoon bordered by a large shingle barrier (Chesil beach). The lagoon flows into Portland Harbour, and subsequently the English Channel. A

high proportion of the 5 km^2 lagoon is intertidal habitat. The maximum depth at Ferrybridge, the constricted channel which connects the Fleet and Portland Harbour, is 3.8 m. To the northwest of the CZ lies The Narrows, a constriction in the lagoon where scouring occurs from strong tidal currents. The Narrows is approximately 65 m wide and is the narrowest point of the Fleet. The 2013 sanitary survey report found strong tidal flows from this point promote mixing in the water column (up to 2 knots). Portland Harbour has a relatively small tidal range (2.0 m Spring; 0.8 m Neap). At low tide there is very limited water movement through The Narrows and Ferrybridge. Tidal streams flood up the lagoon in a north westerly direction towards The Narrows and the upper reaches of the Fleet, and then ebb in the opposite direction. This flooding tide will carry contamination from Portland Harbour into the lagoon, and the ebb will carry contamination from shoreline sources further up to the northwest back out into Portland Harbour (both potentially across the CZ). In particularly strong stormy condition, water from Lyme Bay can come through and over Chesil Beach[16].

The River Wey drains into Radipole Lake approximately 5 km to the northeast of the CZ, which drains out into Weymouth Harbour. No main watercourses drain directly into the Fleet lagoon, but several small streams are present. These freshwater inputs combined with the shallow and enclosed nature of the lagoon may result in higher concentrations of contamination. However, combined with the strong tidal currents seen at The Narrows and Ferrybridge and subsequent significant mixing of the water column, this is unlikely to affect the oyster farm, even at low tide when water flow through these areas is limited.

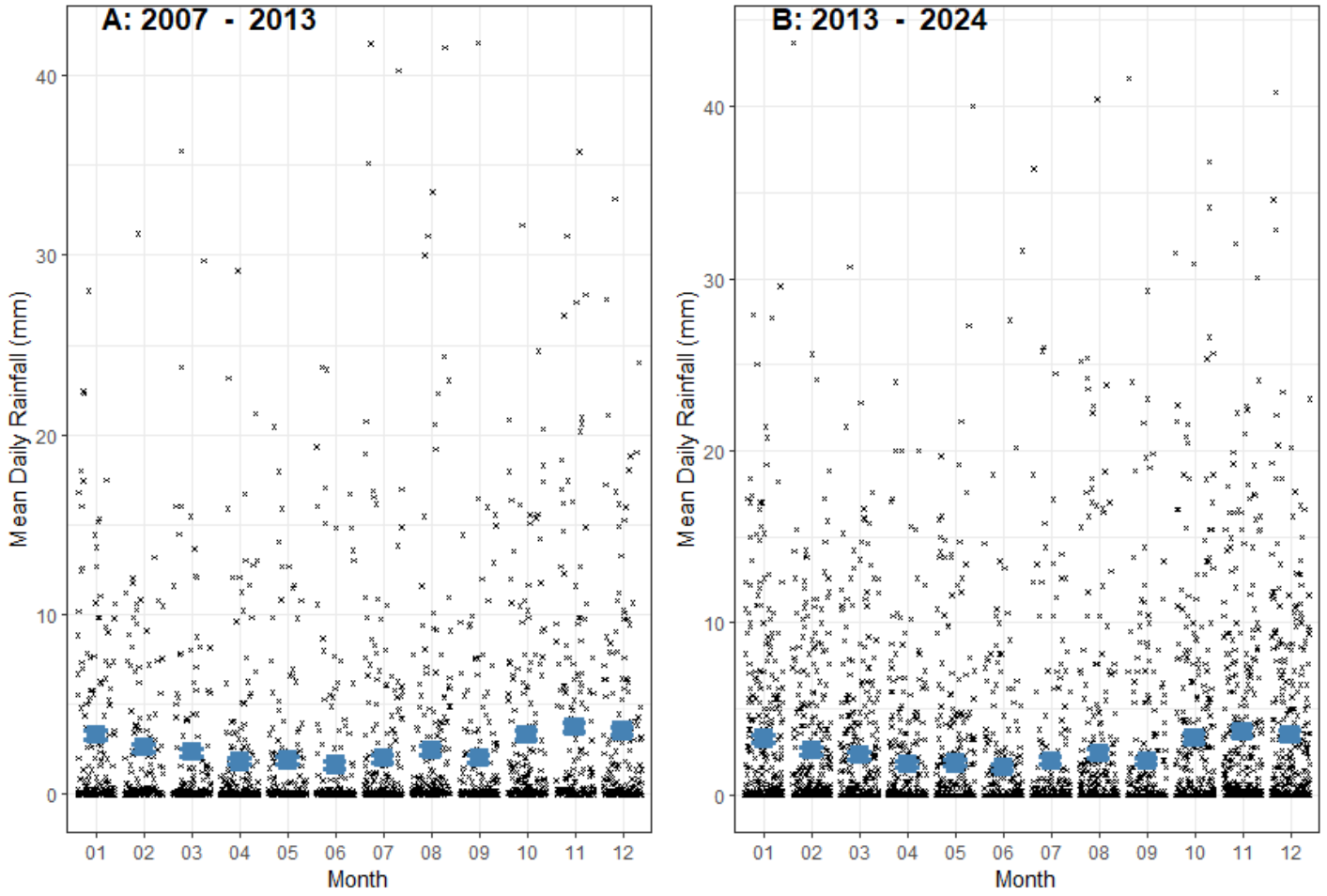
5 Rainfall

A complete record of the rainfall data from the Sutton Poyntz rainfall monitoring station at NGR: SY 70730 84421 (ID: 350533) was downloaded from the Environment Agency's hydrology data explorer[17]. This station was chosen as it is the closest monitoring station to the BMPA with records spanning dates preceding the publication of the 2013 Sanitary Survey report. This monitoring station is approximately 9 km northeast of the *Fleet Oyster Farm* CZ. The data were subdivided into 2007-2013 (pre-sanitary survey) and 2013- present (post sanitary survey), and then 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.

[16] http://www.chesilbeach.org/fleet/tides.html
[17] Environment Agency's Hydrology Data Explorer. Available at: https://environment.data.gov.uk/hydrology/explore#/landing.

Table 5.1 Summary statistics for rainfall preceding and following the 2013 Sanitary Survey report.

Period	Mean Annual Rainfall	Percentage Dry Days	Percentage Days Exceeding 10 mm	Percentage Days Exceeding 20 mm
2007 - 2013	797.40	49.67	26.77	17.21
2013 - 2024	828.22	45.17	29.32	17.73



Archive Daily Rainfall from the Sutton Poyntz (#350533) at NGR SY 7073084421

Data accessed from the Environment Agency's Hydrology Data Explorer, licenced under the Open Government Licence v3.0.

Figure 5.1 Mean daily rainfall per month at the Sutton Poyntz monitoring station at NGR SY 70730 84421 for the period (A) 2007 – 2013 and (B) 2013 – 2024.

The data show that average annual rainfall has increased by 30.82 mm per year, with the percentage of days in each year with heavy rainfall (> 10 mm rain per day) also increasing by approximately 2.5 days. Two-sample T-tests indicated that there was no significant difference (p = 1)[18] in the mean daily rainfall per month between 2007-2013 and 2013 to present. This means that rainfall levels across the catchment have remained statistically similar.

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 and number of spills would be expected to be greatest during this time. As the rainfall patterns have remained (statistically) similar across the two time periods, it is unlikely that bacterial loading due to these factors has changed significantly, and as such RMP 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 Fleet BMPA since 2010 are presented spatially in Figure 6.1 and summary statistics are presented in Table 6.1. Monitoring data from the Cefas datahub has been used in this section, and therefore includes both *Fleet Oyster Farm* and Portland Harbour - *Site A* (now declassified). No additional verification of the data has been undertaken.

[18] A p-value of <0.05 means that there is a greater than 95% probability that the observed differences between the groups didn't occur by chance.

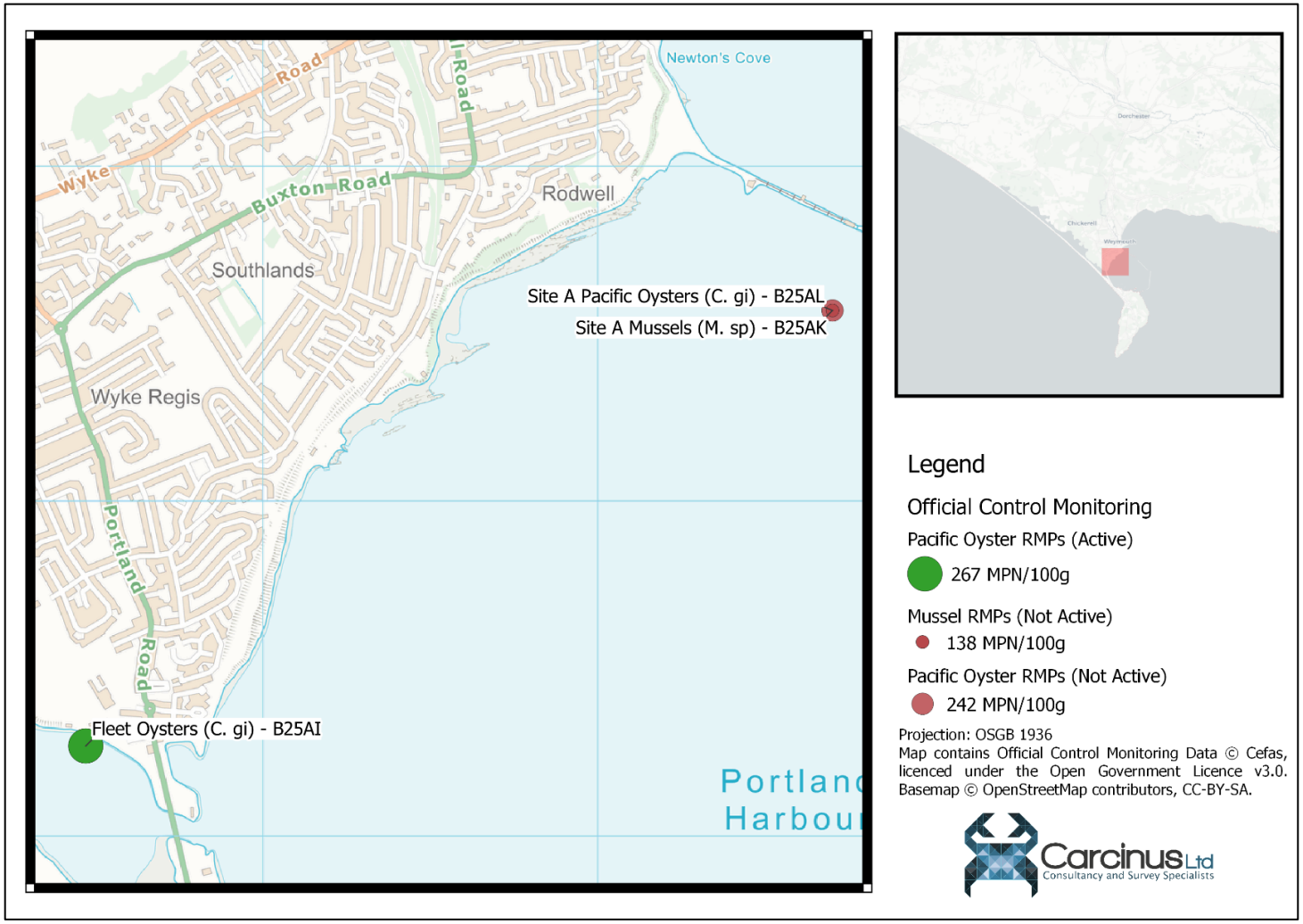


Figure 6.1 Mean E. coli results from Official Control monitoring at bivalve RMPs in The Fleet BMPA. Monitoring data from the declassified Site A RMPs in Portland Harbour are also included for spatial context.

Table 6.1 Summary statistics from Official Control monitoring at bivalve RMPs in The Fleet BMPA. Monitoring data from the Site A RMPs in the Portland Harbour BMPA are also included for spatial context.

RMP (Species)	NGR	Species	No.	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Fleet Oysters (C. gi) - B25AI	SY66477627	Pacific Oyster	118	04/03/2014	20/05/2024	267.94	18	4900	21.19	0.8	0
Site A Mussels (M. sp) - B25AK	SY68707757	Mussels	24	01/02/2021	13/07/2022	138.08	18	780	16.67	0	0
Site A Pacific Oysters (C. gi) - B25AL	SY68707757	Pacific Oyster	9	11/10/2021	13/06/2022	242	18	1300	22.22	0	0

The datahub provides Official Control monitoring data for a total of three RMPs, two of which are for Pacific oyster and one for mussels. Of these RMPs, none were sampled prior to the publication of the 2013 Sanitary Survey Review. Sampling at the Fleet Oysters (C. gi) - B25AI RMP began shortly after the 2013 sanitary survey report, and it is currently the only active RMP. The other two RMPs located in Portland Harbour (Site A mussels (M. sp) – B25AK, Site A Pacific oysters (C. gi) – B25AL) are declassified with the last samples taken in July 2022 and June 2022 respectively.

Site A mussels (M. sp) – B25AK was sampled 24 times in the 18 months it was active, and Site A Pacific oysters (C. gi) – B25AL was sampled 9 times in 9 months. Neither RMP returned a result above 4,600 *E. coli* MPN/100 g. 16.67% of results at Site A mussels (M. sp) – B25AK and 22.22% of results at Site A Pacific oysters (C. gi) – B25AL were above the 230 *E. coli* MPN/100 g threshold.

The Fleet Oysters (C. gi) - B25AI RMP has been active for 10 years and sampled 118 times. Only 0.8% of results have returned a value greater than 4,600 *E. coli* MPN/100 g, and the average result at this RMP is 267.94 *E. coli* MPN/100 g. Figure 6.2 presents box and violin plots of *E. coli* monitoring at the Fleet RMP and at the declassified Pacific oyster RMP within Portland Harbour. 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 RMPs. Significance was taken at the 0.05 level[19]. All statistical analysis described in this section was undertaken in R (R Core Team, 2021).

Figure 6.2 includes monitoring data from the pacific oyster RMPs, demonstrating that results from the Site A Pacific oysters (C. gi) – B25AL RMP are lower than that of the Fleet Oysters (C. gi) - B25AI RMP. The ANOVA test performed on this monitoring data suggested that the differences were not statistically significant ($p = 0.089$).

[19] A p-value of <0.05 means that there is a greater than 95% probability that the observed differences between the groups didn't occur by chance.

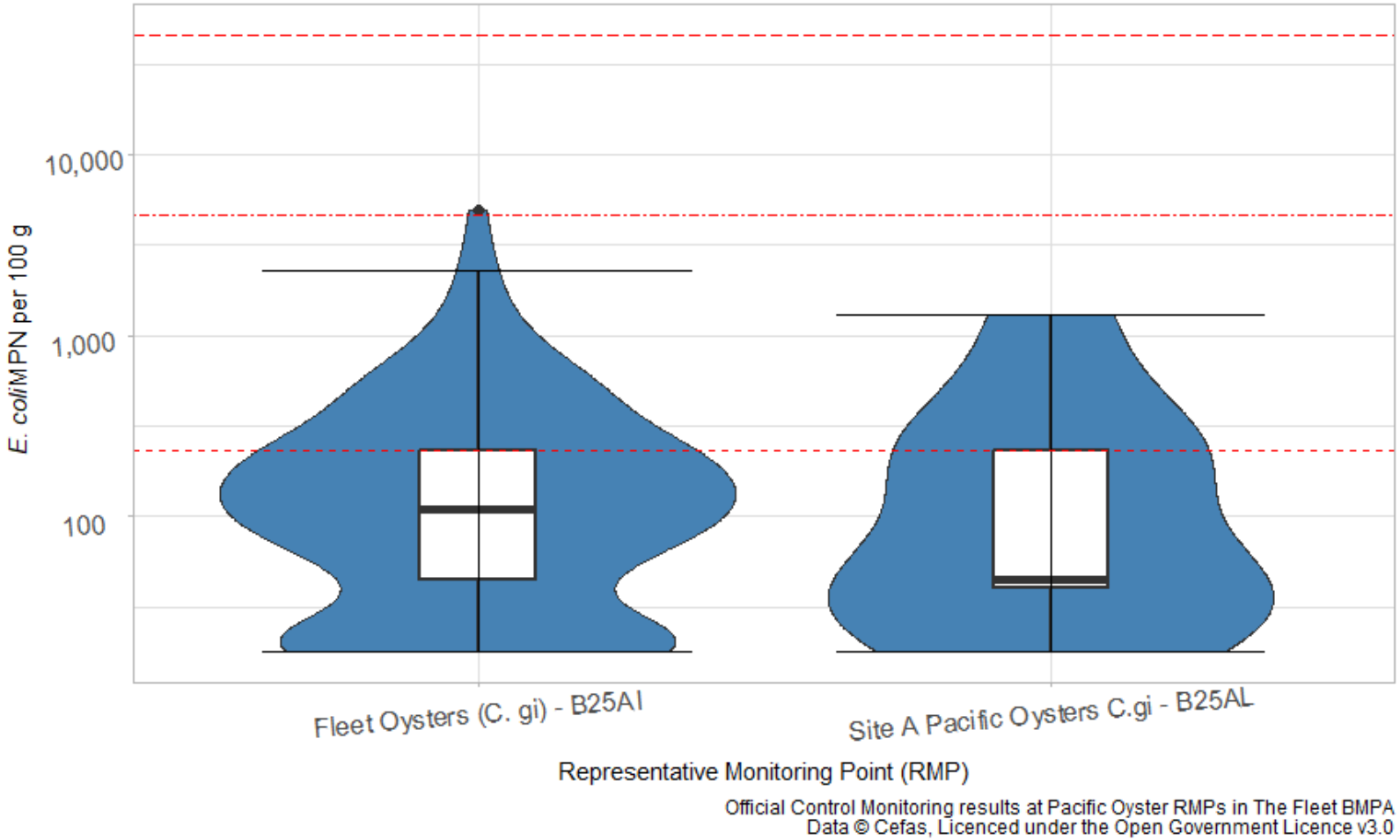


Figure 6.2 Box and violin plots of E. coli monitoring at Pacific oyster RMPs in vicinity of The Fleet BMPA. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution of the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

6.1.2 Overall temporal pattern in results

The overall temporal pattern in shellfish flesh monitoring results within The Fleet BMPA are shown for pacific oysters in Figure 6.3**Error! Reference source not found.**. The figure also includes the data for Site A Pacific Oysters (B25AL) for context.

The monitoring data from the pacific oyster RMPs suggests that the concentration of *E. coli* in shellfish flesh at the Site A Pacific oysters (B25AL) RMP was increasing when sampling stopped in 2022. Given the short sampling window of this RMP, no further conclusions can be drawn from the data. The loess model for Fleet oysters (B25AI) RMP falls below the 230 *E. coli* MPN/100 g threshold (apart from in 2014 when sampling first started). Despite *E. coli* concentrations at Site A Pacific oysters (B25AL) seemingly increasing towards the end of the sampling period, no significance difference was identified in the data for pacific oyster RMPS in Section 6.1.1.

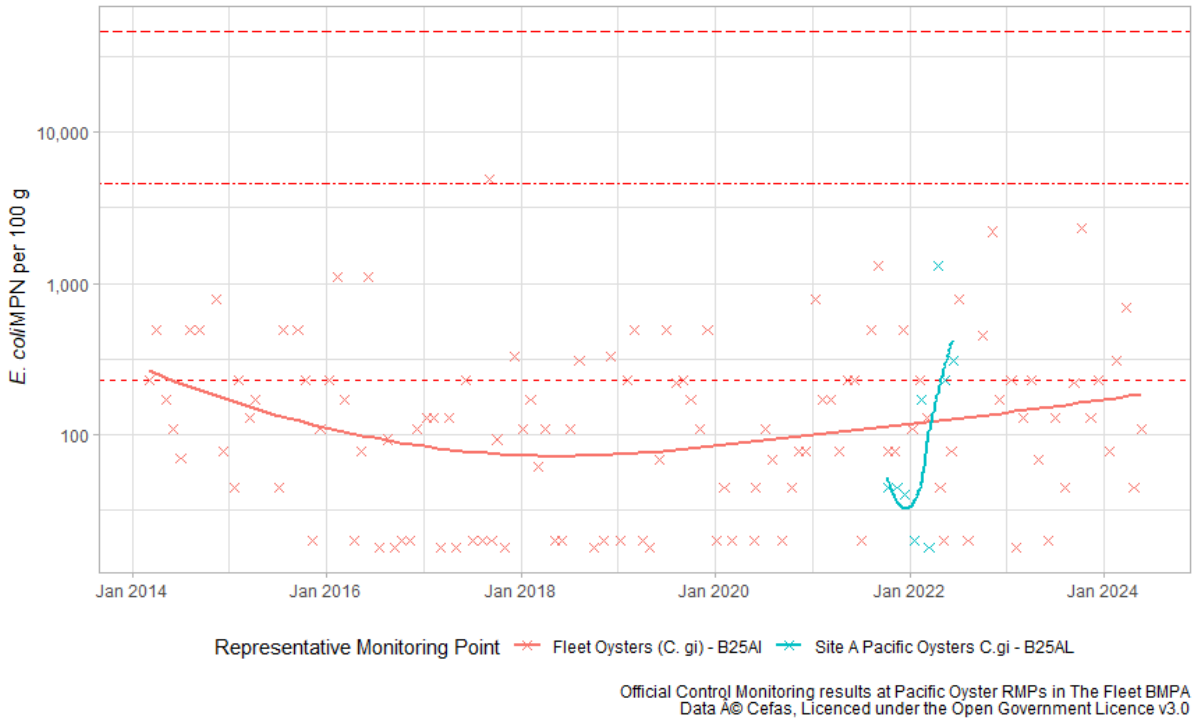


Figure 6.3 Timeseries of E. coli monitoring at pacific oyster RMPs sampled in (and adjacent to) The Fleet BMPA since 2021. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g.

6.1.3 Seasonal patterns of results

Seasonal patterns of *E. coli* flesh concentrations at the RMP in The Fleet BMPA (B25AI) and the declassified Site A Pacific Oyster RMP (B25AL) in Portland Harbour were investigated and shown for pacific oysters in Figure 6.4. 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 Pacific oyster monitoring data, no significant differences were found seasonally between the two RMPs. The data from Autumn at Fleet oysters (B25AI) RMP was significantly different to that in Spring ($p = 0.047$). Data collected at Site A Pacific oysters (B25AL) is limited in quantity, and so only median values at this RMP have been shown in Figure 6.4. Monitoring data in Spring is higher than all other seasons, however no significant differences were found seasonally at this RMP.

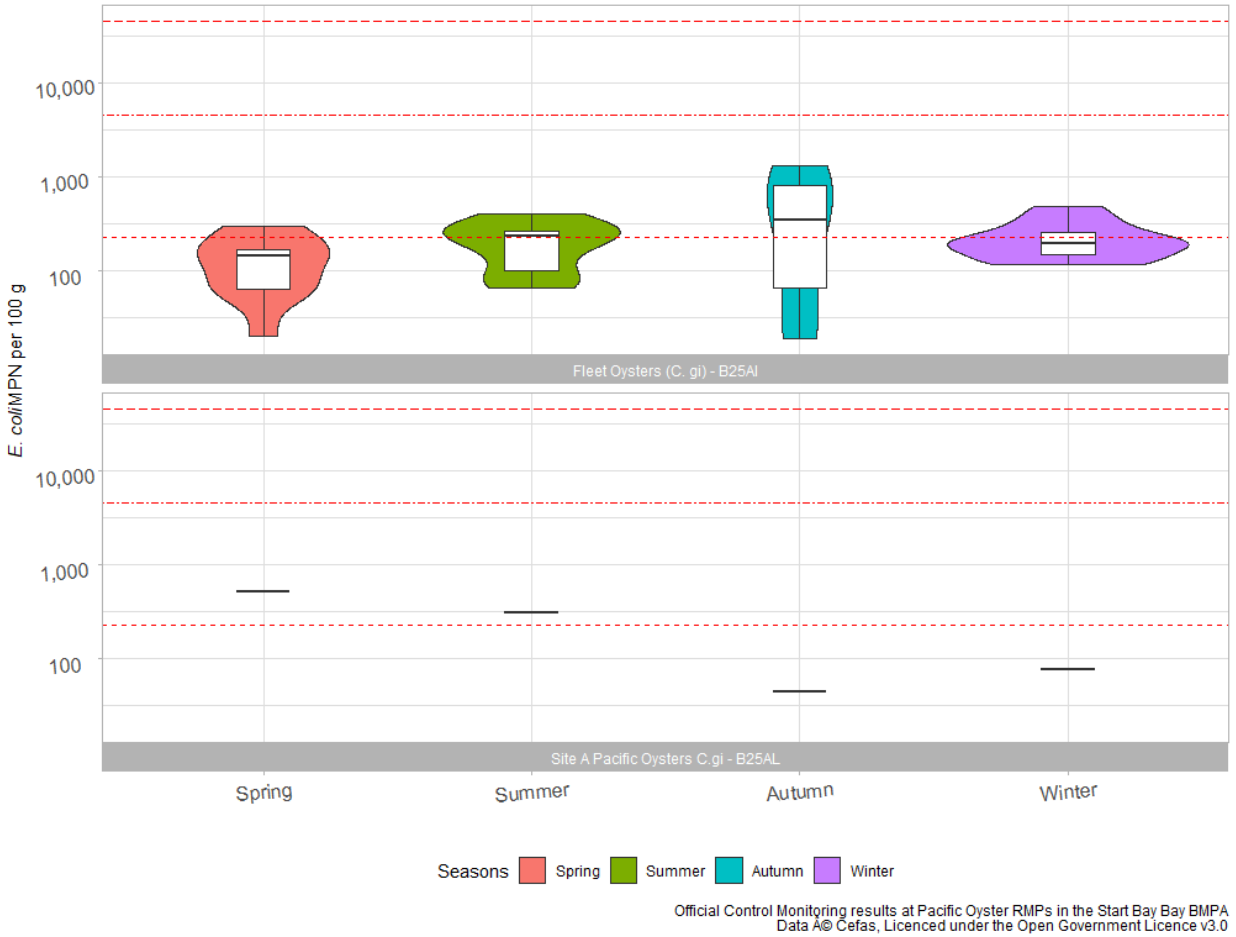


Figure 6.4 Box and violin plots of E. coli levels per season at pacific oyster RMPs (B25AI and B25AL) sampled within and in the vicinity of The Fleet BMPA. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution of the monitoring data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 MPN/100 g respectively.

There are only 9 data points for the Site A pacific oyster RMP (B25AL) spanning October 2021 – June 2022, therefore it is not possible to perform any statistical analysis on this data. When the data from Pacific oyster RMPs was pooled together, monitoring results from Autumn months were significantly higher than those from spring ($p = 0.047$). This is driven by the significantly higher results in autumn than spring at Fleet Oysters (B25AI) RMP ($p = 0.047$). Monitoring results were lowest in spring months, and increase through summer to Autumn when they appear at their highest. These seasonal trends align with higher visitor numbers in summer and increased rainfall in autumn, leading to increased runoff from pasture/farmland in these seasons.

6.2 Action States

Since the publication of the 2013 Sanitary Survey Report, the following Action States have been triggered within the Fleet BMPA:

- On 7 September 2021, a result of 1,300 *E. coli* MPN/100 g was recorded at Fleet Oyster (B25AI) RMP. No action state sampling occurred, and subsequent monthly sampling recorded results of 78 *E. coli* MPN/100 g on 12 October 2021, and 78 *E. coli* MPN/100 g on 9 November 2021. Investigations were unable to link the action state result to an exceptional event (e.g. a 1 in 5-year rainfall, pollution event that has been rectified and unlikely to recur or failure of sampling/testing protocols).

6.3 Bathing Water Quality Monitoring

There are two designated bathing water quality monitoring points[20] in Portland Harbour (Figure 6.5). Both were classified as 'excellent' in 2023. Portland Harbour Castle Cove has been classified 'excellent' since 2019. Portland Harbour Sandsfoot Castle was classified 'excellent' in 2022, and previously 'good' in 2021 and 2019. Portland Harbour Sandsfoot Castle is approximately 1.3 km from the Fleet BMPA whilst Portland Harbour Castle Cove is approximately 1.65 km from the Fleet BMPA. It should be noted that bathing water sampling only occurs during the bathing water season, which falls within the summer period (May to September inclusive) and therefore may not represent the potential for increased faecal loading during winter months. Limited inference can be drawn from the monitoring results from these two locations given their distance from the the Fleet BMPA.

[20] https://www.dorsetcouncil.gov.uk/w/bathing-water-quality

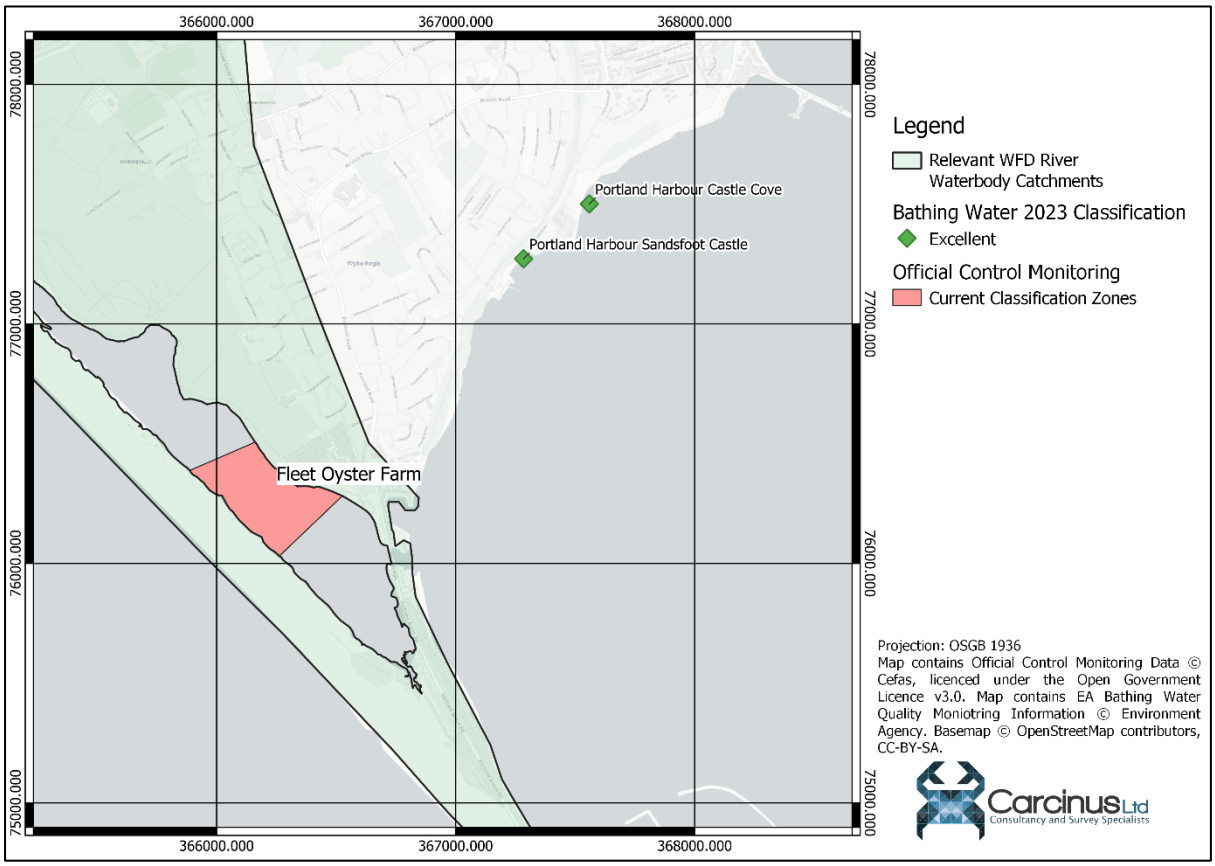


Figure 6.5 Bathing Water Quality Monitoring points within the vicinity of The Fleet BMPA, and their classification status in 2023.

The Shellfish Water Action Plan (published 2021) references shellfish flesh microbial quality monitored under the Shellfish Water Directions. Between 2015 – 2020 inclusive, the shellfish water of the Fleet achieved compliance (≤300 *E. coli*/100 ml). However, in 2021 compliance with the microbial standard was not achieved. The plan states "Compliance is borderline, but it is unlikely to deteriorate and unlikely to require any major intervention".

7 Conclusion and overall assessment

The Fleet BMPA currently has one classification zone, located in The Fleet coastal lagoon on the south coast of England, near Weymouth. A narrow entrance connects the Fleet lagoon to the English Channel via Portland Harbour. Historically, the Fleet was combined with the Portland Harbour BMPA and considered as part of one sanitary survey in 2014. All Classification Zones within Portland Harbour were declassified in 2022 and the Fleet is considered in this review as a distinct BMPA. Pacific oysters are grown on trestles in one CZ (*Fleet Oyster Farm*) in the lagoon. This zone forms the entirety of the BMPA and has an output of 175,000 oyster per year which undergo purification onsite and sold locally at a store near the lagoon.

Analysis of Census data shows that there has been a 5.5 % increase in population between 2011 and 2021, but that the main urban areas within the catchment have remained the

same since the 2013 sanitary survey report. The settlements of Wyke Regis, which lies directly adjacent to the shellfishery, and Chickerell to the north of Wyke Regis (approximately 4 km from the CZ) present the highest risk in terms of urban runoff to the CZ. Chickerell is currently undergoing substantial housing development. Beyond these nearby settlements, the catchment is largely rural. The area continues to be a popular tourist destination with 2.6 million day visitors and 1.6 million overnight visitors on average each year (although more so in summer months). Tourism and this seasonal increase in population can bring additional loading to the wastewater network. At initial consultation, the LA did not express any concern for the capability of the wastewater treatment network to handle the increase from tourism, or additional housing developments.

The Shellfish Action Plan assesses water company assets as a 'medium' risk source of point contamination. There are 3 continuous discharges within the catchment, and of greatest concern in terms of BMPA health is the Weymouth Water recycling centre. This asset has a high Dry Weather Flow (DWF) volume of 32,141 m^3/day and is within close proximity to the BMPA (1.91 km from *Fleet Oyster Farm* CZ). Although this discharge is offshore, tidal currents during adverse weather (e.g. storms) may carry contamination from this source over Chesil Beach into the Fleet lagoon. Potential contamination from this source requires consideration in any updated sampling plan. There are five intermittent discharges within 2 km of the BMPA. One discharges directly in the Fleet lagoon but has not spilled in recent years. The Weymouth Water Recycling Centre has a high spill count and duration, and should be treated with similar regard to the continuous discharge at the same location; storm-like weather may carry contamination through / over Chesil Beach into the BMPA and therefore this discharge should be considered in any updated sampling plan. There are 3 remaining intermittent discharges within 2 km of the CZ. The Castle Cove PS, Rear Doncaster Road, and Hillcrest Road PS discharges are all located in Portland Harbour, and so the flooding tide may carry some contamination into The Fleet BMPA. Of the 15 intermittent discharges between 2 – 5 km from the CZ, most have relatively low spill counts (< 10 number spills per year) and duration (< 10 hours per year). A small cluster of discharges between 2.8 km – 3 km from the CZ in Portland Harbour has been identified as needing consideration in any updated sampling plan due to potential accumulation of bacteria caused by their close proximity to each other. Private discharges are all more than 3 km from the BMPA and so pose little risk in terms of contamination and do not require consideration in any updated sampling plan. There is one miscellaneous discharge located within inside the CZ, flowing into east Fleet. Flow is low at this point source, and the lagoon environment of the BMPA means strong tidal currents and water mixing will dilute any potential contamination. It does not need consideration in any updated sampling plan.

The Shellfish Water Action Plan for The Fleet Shellfish water assesses that agricultural contamination has a 'high' contribution to contamination levels in the area. The primary agricultural land type reported in the plan is arable and pasture. The geology of the catchment suggests permeability of soil is variable and that land bordering the middle and upper reaches of the lagoon where permeability is high may produce significant

groundwater flows. Land cover maps show these areas are pasture and non-irrigated arable land. The livestock data show that between 2016 and 2021 the number of cattle in the catchment increased by 50.7 %, sheep by 65.6 %, and poultry by 21.1 %. In both years, cattle were the largest group in the catchment. 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. During and after periods of heavy rainfall, runoff from agricultural areas will be greatly increased. This is supported by higher monitoring results in autumn when the number of grazing cattle, and amount of rainfall is likely to be greater. Slurry is also spread at this time of year. Although no main rivers drain into the Fleet lagoon, small watercourses carrying contamination from the upper reaches of the catchment can be considered a potential source of contamination. These watercourses flow into the upper Fleet lagoon near Abbotsbury and Langton Herring. The authors of this review have identified a shoreline survey would be beneficial to this assessment to gather more information on the use of farmland close to the CZ and estimate populations of livestock in the areas adjacent to the BMPA (should sufficient information on these sources of contamination not be available following secondary consultation). Potential contamination from agricultural sources should be considered in any updated sampling plan.

The 2021 Shellfish Water Action Plan assesses animals and birds to have a 'low' contribution to contamination in the BMPA as a diffuse source. Whilst there are high numbers of birds in the Fleet and Wey, and it is home to both nationally and internationally important populations of bird species, capturing this source of contamination is difficult given the spatial and temporal variability. No seal colonies reside near the Fleet, and marine mammal sightings are occasional. The effects of wildlife do not need consideration in the placement of any RMP, and the recommendations of the 2013 report remain valid.

Portland port sits at the southern end of Portland Harbour and is the second largest man-made harbour in the world. This port has 12 berths for vessels up to 300 m length and receives traffic carrying a variety of freight. The port is a popular cruise port and is the home port of 11 fishing vessels under 10 m in overall length. 28 fishing vessels list Weymouth Harbour, approximately 1.3 km north-west of the shellfishery, as their home port. There is also a significant volume of recreational boating activity near the BMPA. Portland Marina and Boatyard has space for > 400 vessels, and Weymouth Harbour has space for a further 400 vessels. The closest pump out facilities are in Poole Quay Boat Haven and so recreational vessels of a sufficient size to contain onboard toilets are likely to make overboard discharges from time to time. The greatest impacts are likely to occur in summer months, when vessel numbers are at their highest, but it is impossible to accurately predict the timing or volumes of any contamination. Given the temporal and spatial variation of this contamination source, it does not need consideration in any revised sampling plan.

Monitoring data is available since 2014 for the Pacific oysters RMP in The Fleet BMPA. In 2021 and 2022, sampling occurred at two RMPs (one for pacific oysters and one for mussels) within Portland Harbour (declassified since 2022) and provide useful spatial context. A review of monitoring data demonstrates elevated results in autumn at Pacific oyster RMPs

compared to spring. No other significant differences were found in the data. Data between species was not compared.

This report has identified a knowledge gap regarding agricultural contamination to the BMPA. Limited information is available on the use of farmland close to the Classification Zone, and proximity of populations of livestock in the areas adjacent to the BMPA. In addition, further information is sought on the frequency and likelihood of seawater from the English Channel adjacent to Chesil Beach flowing over the beach into the lagoon where the BMPA is located. Should sufficient information on these potential sources of contamination not be available following secondary consultation, a shoreline survey may be considered to gain further insight.

8 Recommendations

Recommendations for the various classification zones within the Fleet BMPA are summarised below and a recommended sampling plan is provided in Table 9.1.

8.1 Pacific oyster

Fleet Oyster Farm

This CZ covers an area of 0.133 km² and is situated within the Fleet lagoon. Although not classified at the time, it was considered in the 2013 sanitary survey report, which suggested combining the proposed main trestle growing area with a smaller area intended for pre-harvest holding in one CZ as the contaminating influences are not likely to vary between the two given the little spatial variation. The main contaminating sources to the CZ are agricultural sources, urban associated run-off, and sewage discharges. Contamination from boats is also possible given the size of the neighbouring ports/harbours, however this is difficult to quantify given the spatial and temporal variation likely. The RMP is currently well positioned to capture contamination from both urban and agricultural runoff coming from the north into the CZ, and from boats moving through Portland Harbour whereby seawater carrying this contamination floods into the Fleet lagoon. The RMP is also well positioned to capture pollution from the closest intermittent discharges (Ferrybridge PS inside the lagoon, and Rear Doncaster Road and Hillcrest Road PS to the northeast in Portland Harbour). Currently the recommended location for the RMP remains unchanged, and the sampling plan does not need altering. However, further information is sought at secondary consultation regarding how often water flows over Chesil Beach from the English Channel. The Weymouth Water Recycling Centre has a large continuous discharge with high DWF and an intermittent discharge with high spill count and duration. Contamination from this source could be carried over the beach into the CZ, which may require alteration of the sampling plan.

9 General Information

9.1 Location Reference

Production Area	**The Fleet**

Cefas Main Site Reference	M025
Ordnance survey 1:25,000	OL15
Admiralty Chart	2255

9.1.1 Shellfishery

Species	Culture Method	Seasonality of Harvest
Pacific oyster	*Cultured*	*Year round*

9.1.2 Local Enforcement Authority(s)

Name Port Health	**Dorset Council** **County Hall** **Colliton Park** **Dorchester** **Dorset** **DT1 1XJ**
Website	
Telephone number	01305 221000
E-mail address	porthealth@dorsetcouncil.gov.uk

9.2 Sampling Plan

*Table 9.1 Proposed sampling plan for the The Fleet 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
Fleet Oyster Farm	B25AI	Fleet Oysters	SY 6647 7627	50°35'07"N , 002°28'30"W	Pacific oysters	Hand picked	Hand	Pacific oysters	10m	Monthly

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Appendices

Appendix I. Event Duration Monitoring Summary for 2023

ID	Site Name	Permit Number	Receiving Water	Storm Discharge Asset Type	Outlet Discharge NGR (EA Consents Database)	Total Duration (hrs) all spills prior to processing through 12-24h count method	Counted spills using 12-24h count method	Long-term average spill count
1	FERRYBRIDGE PS	402477	THE FLEET	Storm discharge at pumping station	SY6659076230	0.000	0	0.000
2	REAR DONCASTER ROAD	401193	PORTLAND HARBOUR (C)	SO on sewer network	SY6713077010	8.523	11	6.000
3	HILLCREST ROAD PUMPIMG STATION	402476	PORTLAND HARBOUR	Storm discharge at pumping station	SY6729077210	1.750	4	1.250
4	WEYMOUTH WATER RECYCLING CENTRE	400622	(C) ENGLISH CHANNEL	Inlet SO at WwTW	SY6613074360	424.059	90	77.200
5	CASTLE COVE PUMPING STATION	EPRAP3923KW	PORTLAND HARBOUR	Storm discharge at pumping station	SY6768477538	4.153	5	1.500
6	ADMIRAL HARDY CSO	400903	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	24.367	8	9.250

ID	Site Name	Permit Number	Receiving Water	Storm Discharge Asset Type	Outlet Discharge NGR (EA Consents Database)	Total Duration (hrs) all spills prior to processing through 12-24h count method	Counted spills using 12-24h count method	Long-term average spill count
7	CHICKERELL BOYS CLUB CSO	400897	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	5.367	22	7.714
8	CHICKERELL ROAD CSO	400893	WEYMOUTH HARBOUR	SO on sewer network	SY6758078730	14.600	41	22.000
9	LONGCROFT ROAD CSO	400902	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	0.700	7	5.250
10	NEWSTEAD ROAD PUMPING STATION	400892	WEYMOUTH HARBOUR(E)	Storm discharge at pumping station	SY6758078730	0.000	0	-1.000
11	THE MARSH COMBINED SEWER OVERFLOW	400904	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	24.400	9	6.875
12	WARDCLIFFE ROAD CSO	400898	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	0.000	0	0.000
13	WESTON ROAD CSO	400899	WEYMOUTH HARBOUR(E)	SO on sewer network	SY6758078730	2.067	3	1.286
14	VICTORIA SQUARE PORTLAND	040206	PORTLAND HARBOUR	Storm discharge at pumping station	SY6851074510	3.010	12	5.125

ID	Site Name	Permit Number	Receiving Water	Storm Discharge Asset Type	Outlet Discharge NGR (EA Consents Database)	Total Duration (hrs) all spills prior to processing through 12-24h count method	Counted spills using 12-24h count method	Long-term average spill count
15	RODWELL AVENUE CSO	400894	WEYMOUTH HARBOUR VIA SWS (E)	SO on sewer network	SY6806078620	45.833	55	52.000
16	SPRING ROAD COMBINED SEWER OVERFLOW	400900	WEYMOUTH HARBOUR(E) - COVE ROW	SO on sewer network	SY6806078620	0.212	2	0.625
17	MARLOW ROAD COMBINED SEWER OVERFLOW	400895	WEYMOUTH HARBOUR VIA SWS (E)	SO on sewer network	SY6805978622	0.750	3	1.571
18	SPRING LANE CSO	400896	WEYMOUTH HARBOUR VIA SWS (E)	SO on sewer network	SY6805978622	0.000	0	0.143
19	RADIPOLE LAKE PUMPING STATION	401048	WEYMOUTH HARBOUR (E)	Storm discharge at pumping station	SY6766079210	0.000	0	0.000
20	HIGH STREET CSO	041274	WEST BAY (COASTAL)	SO on sewer network	SY6838473264	4.367	31	18.429
21	WESTON STREET	401192	GROUNDWATER VIA INFILT SYSTEM	SO on sewer network	SY6851470883	7.367	12	8.500

ID	Site Name	Permit Number	Receiving Water	Storm Discharge Asset Type	Outlet Discharge NGR (EA Consents Database)	Total Duration (hrs) all spills prior to processing through 12-24h count method	Counted spills using 12-24h count method	Long-term average spill count
	COMBINED SEWER OF							
22	PORTLAND RAILWAY GRAVITY SEWER	040634	LYME BAY (C)	Storm discharge at pumping station	SY7070072300	0.567	2	2.800
23	PENNSYLVANIA ROAD PS	402253	GROUND	Storm discharge at pumping station	SY6961071170	0.000	0	0.000
24	SOUTHWELL PS	040686	FRESHWATER BAY	Storm discharge at pumping station	SY6908069880	23.783	19	11.750
25	PORTLAND BILL STORM OVERFLOW	402219	ENGLISH CHANNEL(C)	Storm discharge at pumping station	SY6777068280	6.967	8	51.500
26	LANGTON HERRING WRC	040049	TRIBUTARY OF WEST FLEET	Inlet SO at WwTW	SY6093382762	59.500	28	15.500
27	ABBOTSBURY WWTW	040001	ABBOTSBURY BROOK	Storm tank at WwTW	SY5885584921	2014.467	98	33.667
28	CHURCH STREET	401866	MILL STREAM	Storm discharge at	SY5771085025	25.667	17	9.800

ID	Site Name	Permit Number	Receiving Water	Storm Discharge Asset Type	Outlet Discharge NGR (EA Consents Database)	Total Duration (hrs) all spills prior to processing through 12-24h count method	Counted spills using 12-24h count method	Long-term average spill count
	PUMPING STATION			pumping station				

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Carcinus was established in 2016 by its directors after over 30 years combined experience of working within the marine and freshwater environment sector. From our base in Southampton, we provide environmental consultancy advice and support as well as ecological, topographic and hydrographic survey services to clients throughout the UK and overseas.

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