Sanitary Survey- Review

Southampton Water – 2023

Document No. – *J0591/23/01/13*

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Document QA and Approval

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Initial Consultation

Consultee	**Date of consultation**
Southampton Port Health Authority	November 2022
Southern Inshore Fisheries and Conservation Authority	November 2022
Environment Agency	November 2022

Consultation on draft report

Consultee	Date of consultation
Southern Inshore Fisheries and Conservation Authority	April 2023
Environment Agency	April 2023

A sanitary survey relevant to the bivalve mollusc beds in Southampton Water was undertaken in 2009 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 Survey was subsequently reviewed in 2015 under the same legislative framework. 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, Southampton Port Health Authority. The report is publicly available via the Carcinus Ltd. website.

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Carcinus Ltd., 2022. Review of the Southampton Water 2023 Sanitary Survey Review. 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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Contents

List of figures

List of tables

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 2015 sanitary survey review was undertaken. It does not assess chemical contamination, or the risks associated with biotoxins. This 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 Southampton Water Review

This report reviews information and makes recommendations for a revised sampling plan for existing *Tapes* spp. clams, American hard Clam (*Mercenaria mercenaria*), native oyster (*Ostrea edulis*) and Pacific oyster (*Crassostrea gigas*) classification zones in Southampton Water (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) and Inshore Fisheries and Conservation Authority (IFCA) responsible for the production area, and the Environment Agency (EA) was undertaken in November 2022. 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 LAs, industry and other Local Action Group (LAG) members was undertaken in March and April 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.

This review updates the previous assessment conducted in 2023 (which was itself a review of the original 2009 survey) and sampling plan as necessary and the report should be read in conjunction with the previous survey and review.

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

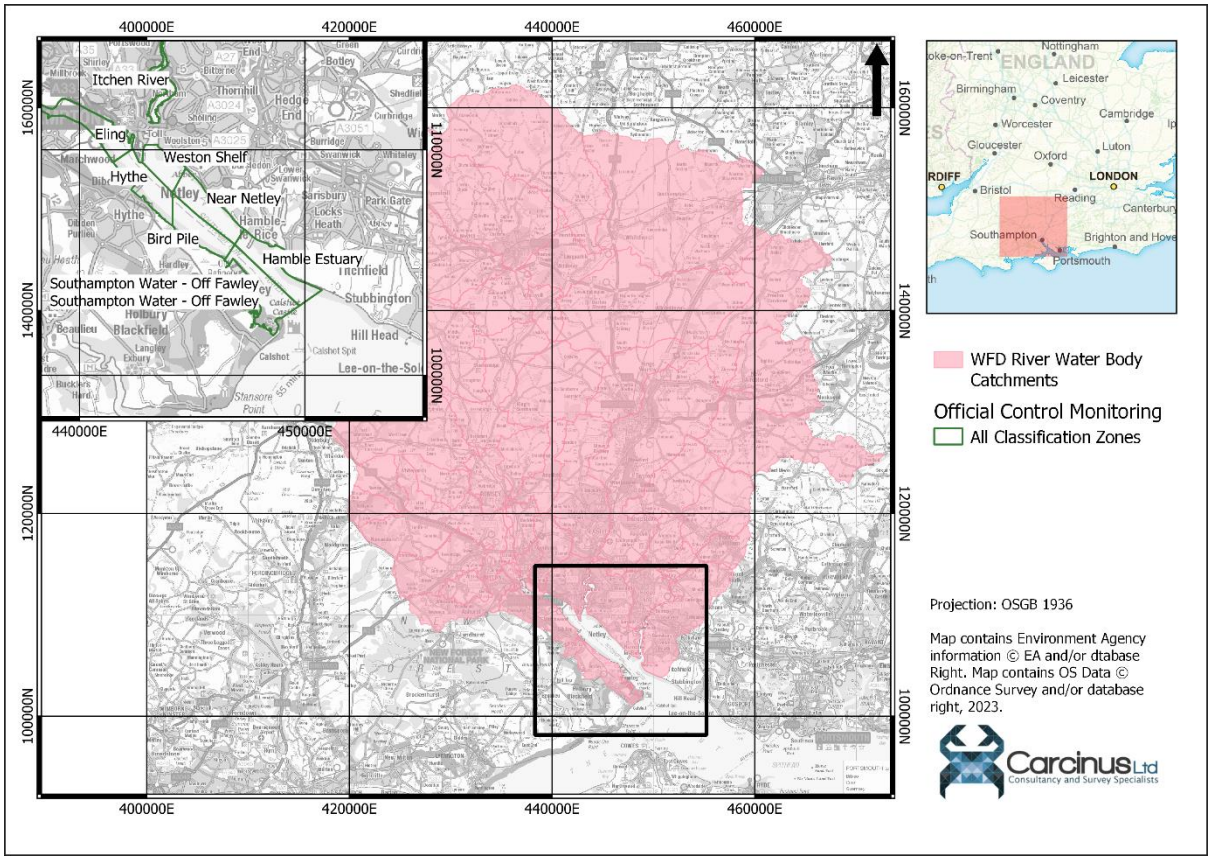


Figure 1.1 Location of Southampton Water. Inset map shows position of current Classification Zones (including Prohibited zones).

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 December 2022;
- Only information that may impact on the microbial contamination was considered for this review; and

- Official Control monitoring data were requested directly from Cefas, with no additional verification of the data undertaken. The data are freely available from the Cefas data hub[1]Results up to and including December 2022 have been used within this study. Any subsequent samples have not been included.

2 Shellfisheries

2.1 Description of Shellfishery

Southampton Water is the tidal estuary that extends from the confluence of the Test and Itchen rivers to where it meets the Solent, north of the Isle of Wight (Figure 1.1). The Solent is a separate BMPA (Cefas Reference: M024); there is no definitive boundary between the two waterbodies. The Southampton Water Bivalve Mollusc Production Area (BMPA) covers the entirety of the estuary, from its mouth between Calshot Spit and the Solent Breezes Holiday Park, to the River Test around Marchwood and the Port of Southampton and the River Itchen up to the Woodmill Lane bridge. Currently, Classification Zones (CZs) in the upper reaches of the estuary (within the river Itchen and Eling areas) is Prohibited, however if these areas were reclassified those CZs would be part of the Southampton Water BMPA. The river Hamble joins Southampton Water near its mouth. The only classified zone in this area is located at the point the Hamble joins Southampton Water. There are no shellfish classification zones (CZs) in the remainder of this waterbody.

The Local Enforcement Authority (LEA) responsible for this fishery in terms of food hygiene official control purposes (including sampling) is Southampton Port Health Authority. Several other neighbouring Local Authorities have jurisdiction over the land surrounding Southampton Water, including New Forest District Council, Southampton City Council, Eastleigh Borough Council and Fareham Borough Council.

Southampton Water is a public fishery. During initial consultations, Southern Inshore Fisheries and Conservation Authority (S-IFCA) reported that fishing activities are managed under section 6 of the Marine and Coastal Access Act 2009[2]. Under this legislation, S-IFCA impose several byelaws, some that apply to all harvested species in the fishery and some that are specific to particular species (Southern IFCA, 2022). Byelaws that apply to all species in the fishery include the Bottom Towed Fishing Gear Byelaw 2016, which prohibits the use of bottom towed fishing gear at specified areas (Figure 2.1) within S-IFCA's district, unless written dispensation is given by the Authority. The Authority also reserves the right under the Temporary Closure of Shellfish Beds byelaw to formally close any shellfish bed where *"…any bed or part of a bed of shellfish is so severely depleted as to require temporary closure in order to ensure recovery, or any bed or part of a bed contains mainly immature or undersized shellfish which in the interests of the protection and development of the fishery*

[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/.
[2] Marine and Coastal Access Act 2009. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents

ought not to be fished for the time being, or any bed of transplanted shellfish ought not to be fished until it has become established…".

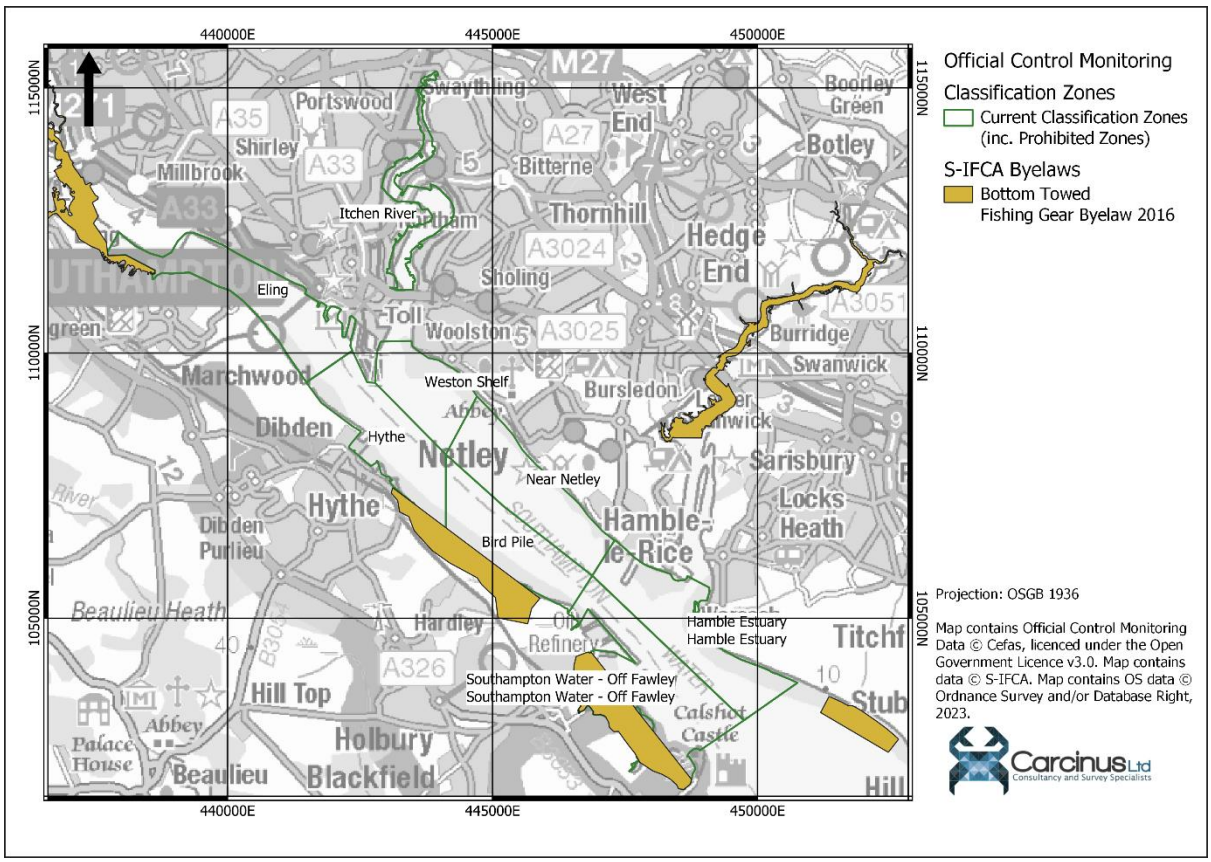


Figure 2.1 Areas of Southampton Water where the S-IFCA Bottom Towed Fishing Gear Byelaw applies.

A summary of the fishery for each commercially harvested species is summarised in the sections below.

2.1.1 *Tapes* spp. clams

The 2015 Sanitary Survey review identified that the harvest of Manilla clams (*Tapes* spp.) in the northern part of Southampton Water (including River Itchen) was prohibited due to high levels of *E. coli* in the shellfish flesh, but that illegal harvesting was ongoing. The first *Tapes* spp. CZ to be upgraded from Prohibited Status to Class C was *Bird Pile* in 2016, with the other CZs being upgraded to Class C in 2019 (*Hamble Estuary* & *Eling*) and 2020 (*Near Netley*). The *Eling* CZ (at the northern end) was again designated Prohibited in 2020 following results above the maximum permitted for classification. This CZ is currently undergoing monitoring to seek an upgrade from prohibited status.

The landings of this species across the whole S-IFCA district are provided in Figure 2.2. S-IFCA's district extends from the Devon/Dorset border in the west to the Hampshire/Sussex border in the east. Within this area are the Lyme Bay, Medina, Poole Harbour, Beaulieu, Portland Harbour, Solent, Southampton Water, Chichester Harbour and Portsmouth

Harbour BMPAs. The catch of this species from within Southampton Water is not known, as the LEA indicated during initial consultations that shellfish are caught from Southampton Water and then landed at many different ports across the south coast. The 2019 stock survey report published by S-IFCA ((S-IFCA, 2019) notes that the catch of Manila clams in Southampton Water is sporadic, with between 1,384 and 3,070 individual clams caught during dredge surveys in 2019. The survey report also notes that most clams caught by S-IFCA during the surveys were under the minimum landing size for this species which is 35 mm across the widest part of the shell. The 2022 bivalve stock survey report published by S-IFCA (S-IFCA, 2022a) states that Catch per Unit Effort (CPUE) for manila clam was significantly higher in 2020 than 2018 or 2022, but there were no significant differences in CPUE between surveys conducted in 2021 and surveys in 2022. Manila clams sampled in 2021 across Southampton Water were on average larger than sampled in previous years, and were larger than the minimum landing size for this species. The survey report notes that this pattern is driven by the comparatively large size of clams sampled in the river Itchen (39.4 mm) compared to other locations in the waterbody. Without the inclusion of the river Itchen sample, the average size is 34.2 mm (below minimum landing size). The survey report concludes that the active fishery for this species, with 55.3 tonnes being caught in 2022, is not negatively impacting the manila clam population of Southampton Water.

Figure 2.2 Landings of manila clam into the S-IFCA District from 2005 - 2019. Figure produced by S-IFCA based on data from the Marine Management Organisation and provided during initial consultations.

2.1.2 American Hard Clam

At the time of the 2015 sanitary survey review, hard clams (*M. mercenaria*) were classified at the southern end of Southampton Water. The northern section (including the River

Itchen) of the BMPA was prohibited for the harvesting of all species, including hard clams. The *Netley* and *Weston* CZs for this species were upgraded from Prohibited Status in 2019, whereas the other CZs for this species at the southern end of the estuary have had stable LT-B (long-term B) classifications since the 2015 review was published.

Figure 2.3 shows the landings of hard-shelled clam into the S-IFCA district between 2005 and 2019, indicating that a peak was reached in 2014 before a significant fall to 2018. that Stocks have been recovering since then, similar to the pattern for manila clams. As above, the catch of this species from within Southampton Water is not known, as the LEA indicated during initial consultations that shellfish are caught from Southampton Water and then landed at many different ports across the south coast. The most recent stock survey report published by S-IFCA (S-IFCA, 2019) notes that the catch of hard-shelled clam is very low (only 29 individuals across all 2019 surveys), with the average individual caught during these surveys as being smaller than the minimum landing size of 63 mm. That report does note that the species is not targeted to the same effort level as manila clam. No data on this species is included in the 2022 bivalve stock assessment report published by S-IFCA (S-IFCA, 2022a).

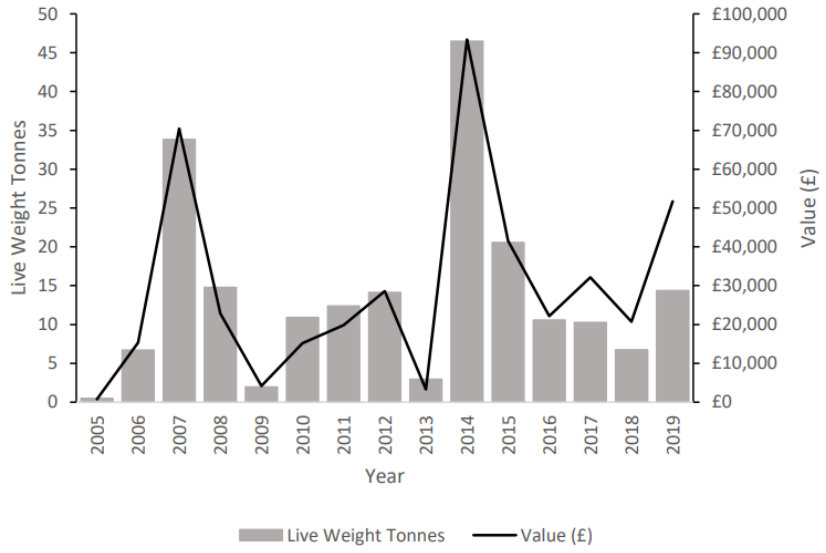


Figure 2. Landings of hard-shelled clam (*Mercenaria mercenaria*) into the Southern IFC district from 2005 to 2019. Data received from the Marine Management Organisation (MMO).

Figure 2.3 Landings of hard-shelled clam into the S-IFCA district from 2005 - 2019. Figure produced by S-IFCA based on data from the Marine Management Organisation and provided during initial consultations.

2.1.3 Native oyster

Historically, this area of the south coast of England has supported significant populations of native oysters, but the species has seen a significant decline in recent years. The 2015 sanitary survey review noted that the Solent Fishery (which includes Southampton Water)

was closed at the time of that report due to low stock levels). The 2021 oyster survey of Southampton Water (S-IFCA, 2021) reported that 80.65% of oysters were below the minimum landing size of 70 mm. The survey found significant aggregations of oyster spat at the mouth of the Hamble (within the *Hamble Estuary* CZ), suggesting that populations may be recovering, provided the spat makes it to maturity. The most recent oyster survey, conducted in July 2022 (S-IFCA, 2022b), notes that 69% of oysters were below the 70 mm threshold, with a CPUE of 1.2 kg/m/hr (the threshold for a healthy fishery in this area is set at 15 kg/m/hr). The survey report notes that the CPUE for the Hamble (the only surveyed area within the Southampton Water BMPA) has fallen from 2017 – 2022. This suggests that it is unlikely that S-IFCA will reopen the native oyster fishery in the coming years.

The close season for native oysters is 1st March to the 31st October inclusive. This prohibits dredges with a front edge or blade exceeding 1.5 m to be used to harvest native oysters in this period.

2.1.4 Pacific oyster

The 2015 sanitary survey review noted that there were naturalised populations of Pacific oyster within the estuary, and that there was some evidence of hand-gathering, but no interest in commercial exploitation and no CZs were recommended. The *Hamble Estuary* CZ has been classified for this species since July 2022, but no stock assessment is available. During secondary consultation, S-IFCA stated that they believe some hand gathering is taking place at the mouth of the river Hamble, on the Weston Shore and around Hythe but could not be more specific. No byelaws apply to the fishing of this species within the Southampton Water BMPA.

2.1.5 Other species

There is an active fishery for King Scallop (*Pecten maximus*) within Southampton Water, and S-IFCA impose several byelaws on the fishing of this species. Retained Regulation (EC) No 853/2004 permits scallops (pectinidae) to be harvested from unclassified waters providing they are placed on the market via a fish auction, a dispatch centre or a processing establishment. Such consignments must be subject to a system of own checks by food business operators to demonstrate compliance with health standards. There are no classified zones for King Scallops (Pecten maximus) in Southampton Water and so this species does not require further consideration within this review.

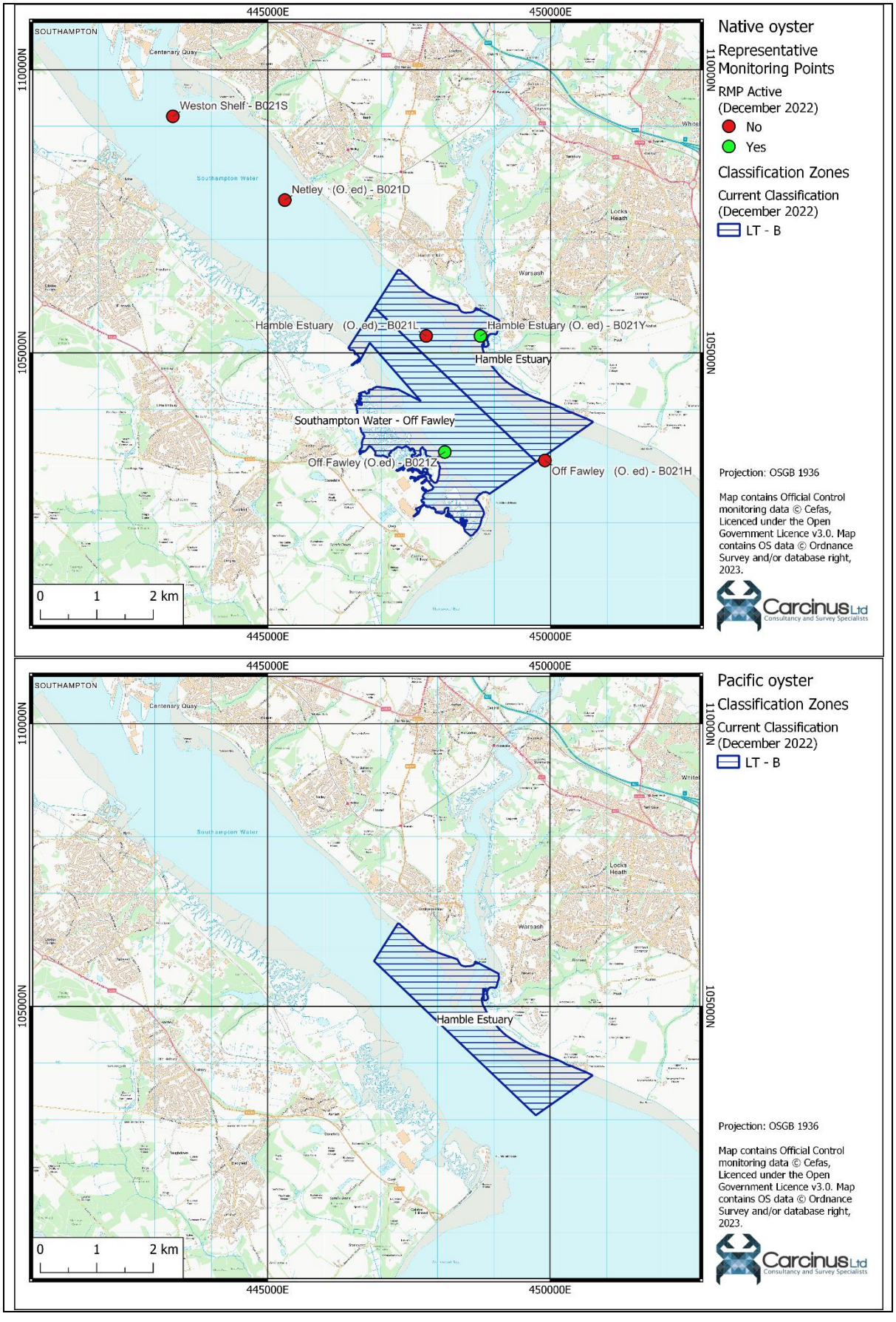
The 2019 bivalve stock assessment (S-IFCA, 2019) reported that cockle stocks in Southampton Water were growing, with over 3,000 individuals caught in Spring 2019, and most of those larger than the 24.8 mm minimum landing size. The 2022 Survey report (S-IFCA, 2022a) states that there was good spatfall for cockles in 2020/2021. During initial consultations, S-IFCA provided evidence that cockles are being harvested as by-catch during dredge fishing of both the *Tapes* spp. and American Hard clam species classified in the BMPA, and recommendations will be made in Section 8 for this species accordingly.

2.2 Classification History

The 2015 Review recommended the creation of 18 CZs for the Southampton Water BMPA, with 6 CZs each for native oyster, *M. mercenaria* and *Tapes* spp. clams. Currently, there are 12 CZs, 6 for *Tapes* spp., 3 for *M. mercenaria*, 2 for native oyster and 1 for Pacific oyster. The *Eling* and *Itchen River* CZs are currently prohibited for all species. 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 2.4.

Table 2.1 Summary of currently active Classification Zones in the Southampton Water BMPA.

Classification Zone	Species	Current Classification (as of December 2022)
Bird Pile	*M. mercenaria*	C
	Tapes spp.	C
Hamble Estuary	*M. mercenaria*	B-LT
	Native oyster	B-LT
	Pacific oyster	B-LT
	Tapes spp.	B
Hythe	*Tapes* spp.	C
Near Netley	*Tapes* spp.	C
Southampton Water – Off Fawley	*M. mercenaria*	B-LT
	Native oyster	B-LT
	Tapes spp.	B
Weston Shelf	*Tapes* spp.	C
Eling		Prohibited for all species
Itchen River		Prohibited for all species


445000E
450000E
1100000N
1050000N
SOUTHAMPTON
Centenary Quay
Weston Shelf - B021S
Southampton Water
Netley (O. ed) - B021D
Hamble Estuary (O. ed) - B021L
Hamble Estuary (O. ed) - B021Y
Hamble Estuary
Southampton Water - Off Fawley
Off Fawley (O.ed) - B021Z
Off Fawley (O. ed) - B021H
Warsash
Locks Heath
0 1 2 km
Native oyster
Representative Monitoring Points
RMP Active (December 2022)
No
Yes
Classification Zones
Current Classification (December 2022)
LT - B
Projection: OSGB 1936
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Pacific oyster
Classification Zones
Current Classification (December 2022)
LT - B
Hamble Estuary
Projection: OSGB 1936
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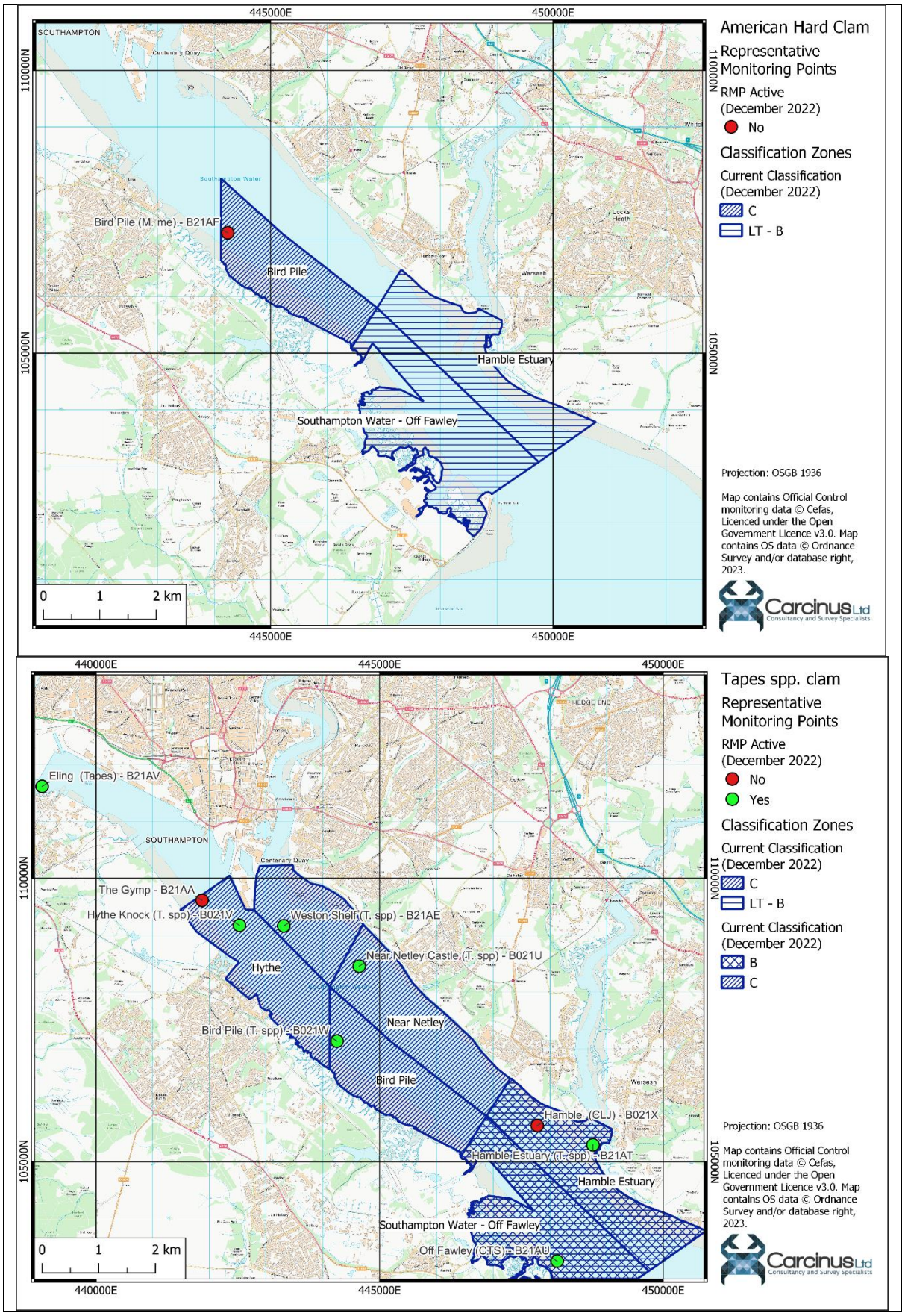
445000E
450000E
110000N
105000N
SOUTHAMPTON
Centenary Quay
Bird Pile (M. me) - B21AF
Bird Pile
Hamble Estuary
Southampton Water - Off Fawley
0
1
2 km
American Hard Clam
Representative Monitoring Points
RMP Active (December 2022)
No
Classification Zones
Current Classification (December 2022)
C
LT - B
Projection: OSGB 1936
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440000E
445000E
450000E
110000N
105000N
HEDGE END
Eling (Tapes) - B21AV
SOUTHAMPTON
Centenary Quay
The Gymp - B21AA
Hythe Knock (T. spp) - B021V
Weston Shelf (T. spp) - B21AE
Near Netley Castle (T. spp) - B021U
Hythe
Bird Pile (T. spp) - B021W
Near Netley
Bird Pile
Hamble (CLJ) - B021X
Hamble Estuary (T. spp) - B21AT
Hamble Estuary
Southampton Water - Off Fawley
Off Fawley (CTS) - B21AU
0
1
2 km
Tapes spp. clam
Representative Monitoring Points
RMP Active (December 2022)
No
Yes
Classification Zones
Current Classification (December 2022)
C
LT - B
Current Classification (December 2022)
B
C
Projection: OSGB 1936
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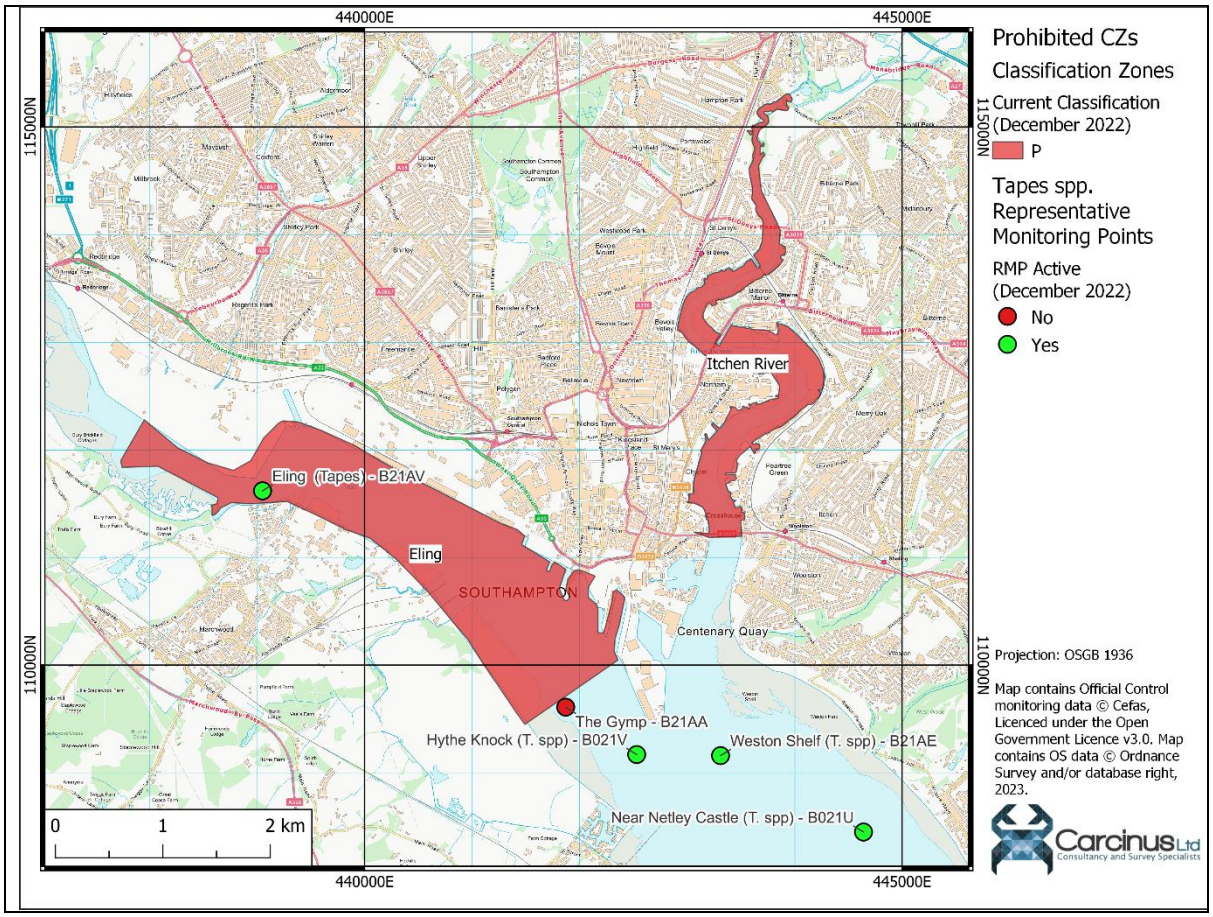


Figure 2.4 Current classification zones for the active CZs and prohibited zones in the Southampton Water BMPA.

3 Pollution sources

3.1 Human Population

The 2015 sanitary survey review cites population data for the catchment using the 2011 Census. A subsequent Census was conducted in March 2021, and so the results of these two surveys have been used 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) wholly or partially contained within the Southampton water catchment at the 2011 and 2021 Censuses are presented in Figure 3.1.

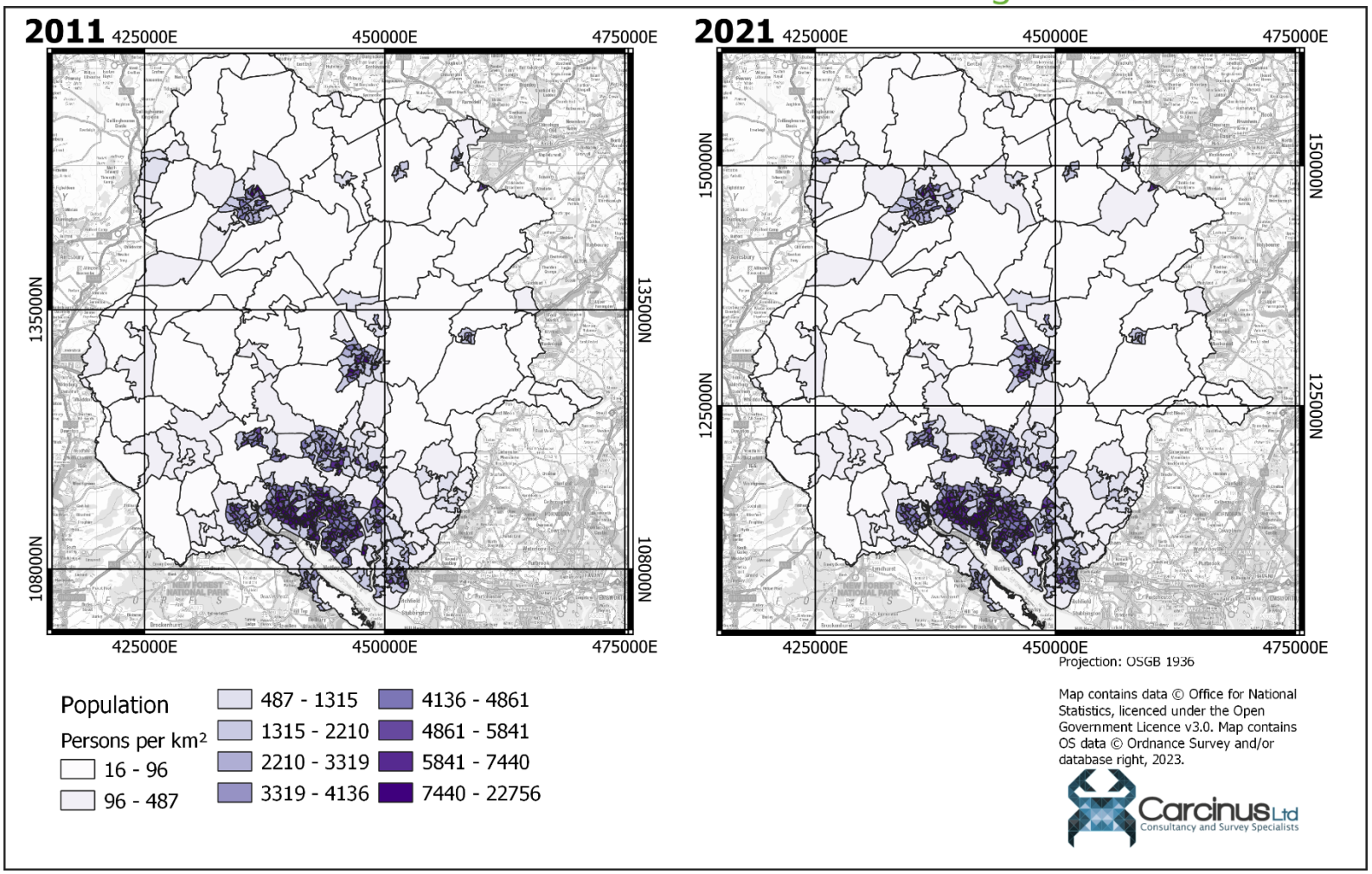


Figure 3.1 Changes in human population density in census super output areas (lower layer) that are contained wholly or partially within the Southampton Water catchment.

The maps presented in Figure 3.1 suggest that the catchment can be thought of in two sections; the upper catchment that is characterised by population densities of <500 people per km², and the lower catchment immediately surrounding the shellfish beds with densities of > 6,000 people per km² common. The 2015 sanitary survey review noted that Southampton, the major urban conurbation of the catchment, saw significant increases in population density between the 2001 and 2011 censuses. Population density of this city, and the other major conurbations of the catchment (Eastleigh, Winchester and Andover) have continued to increase. The population of the catchment at the 2011 census was estimated to be 791,664. By the 2021 Census this has increased to an estimated 841,925 people, an increase of 6.34%. Any increase in population would place additional loading on the Wastewater Treatment Network, changes to which are discussed in the next section.

Neither the 2015 sanitary survey review nor the 2009 sanitary survey comment on the volume of tourism that the area receives. It is likely that the area sees some increase in population numbers during the summer months, mainly due to the recreational boating activity in the area (see Section 3.5).

The greatest potential for urban runoff remains the city of Southampton and surrounding suburbs, particularly on the eastern side of the estuary, as these are the major urban centres of the catchment and they are immediately adjacent to the BMPA. Whilst population growth will have likely increased the contribution from urban diffuse sources, the pathway for contamination from this source of pollution is considered to have remained broadly similar to the situation described in the 2015 Sanitary Survey review. Therefore the considerations outlined in relation to sampling plans in the 2015 review remain valid in relation to these sources.

3.2 Sewage

Details of all consented discharges in the vicinity of the Southampton Water catchment were taken from the most recent update to the Environment Agency's national permit database at the time of writing (October 2022). The locations of these discharges within the BMPA and near the Classification Zones are shown in Figure 3.2.

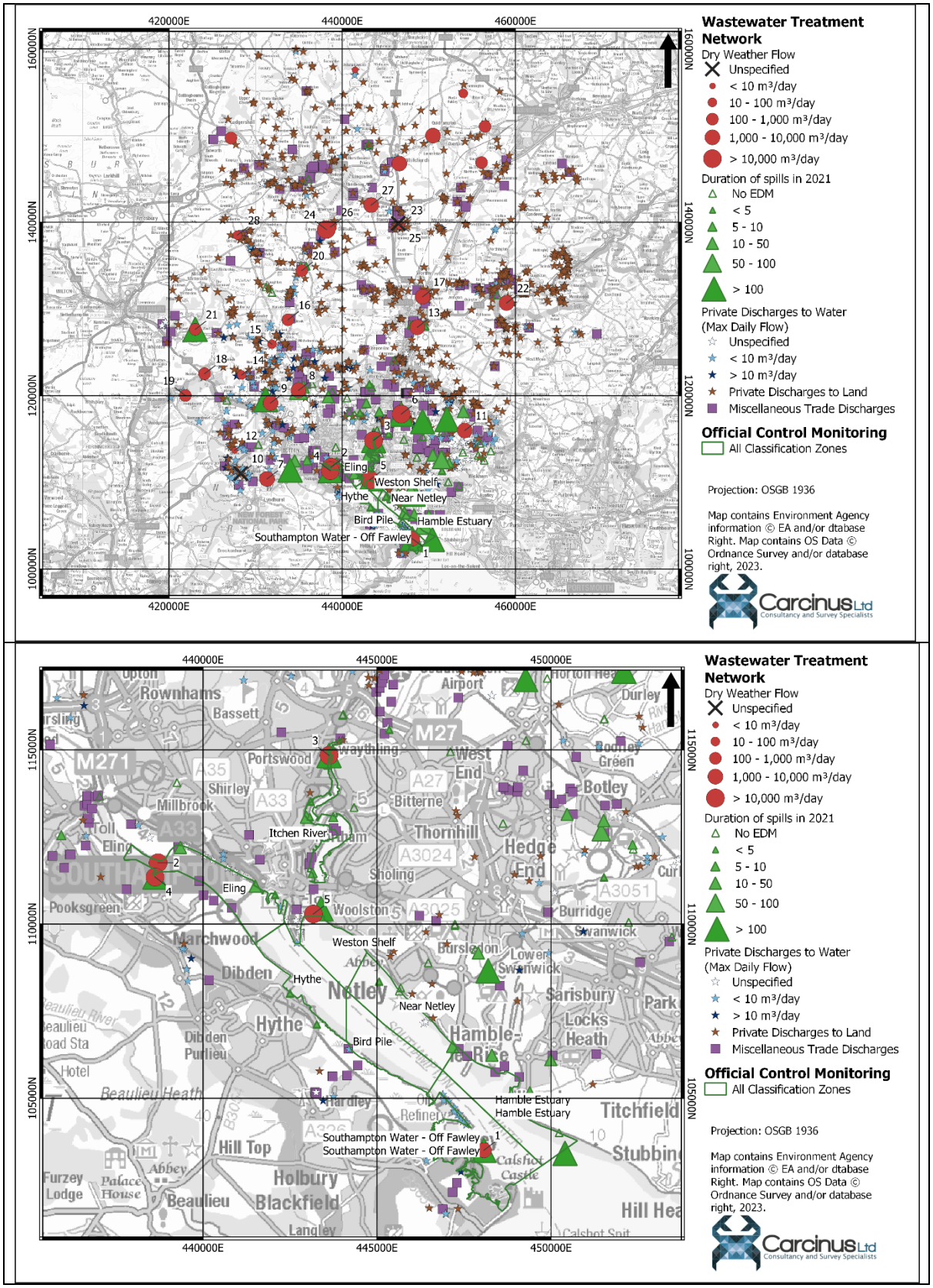


Figure 3.2 Locations of all consented discharges in the Southampton Water catchment (top panel) and in the vicinity of the BMPA (bottom panel). Labels refer to continuous discharges, details of which can be found in Table 3.1.

Table 3.1 Details of all continuous discharges in the vicinity of the Southampton Water catchment. Discharges are ranked by the distance to the nearest CZ.

ID	Discharge Name	NGR	Treatment	Dry Weather Flow (m^3/day)	Distance to nearest CZ (km)
1	ASHLETT CREEK WWTW	SU4807003510	SECONDARY	3,024	0
2	MILLBROOK WWTW	SU3871011760	BIOLOGICAL FILTRATION	40,007	0
3	PORTSWOOD WWTW	SU4362014840	BIOLOGICAL FILTRATION	27,700	0
4	SLOWHILL COPSE WWTW	SU3862011350	BIOLOGICAL FILTRATION	16,317	0.05
5	WOOLSTON WWTW	SU4317010290	BIOLOGICAL FILTRATION	15,000	0.07
6	CHICKENHALL EASTLEIGH WWTW	SU4681017880	CHEMICAL - PHOSPHATE STRIPPING	32,000	3.85
7	LYNDHURST WASTEWATER TREATMENT WORK	SU3132010400	CHEMICAL - PHOSPHATE STRIPPING	1,182	6.58
8	ROMSEY WWTW	SU3495020620	CHEMICAL - PHOSPHATE STRIPPING	7,379	8.86
9	WEST WELLOW WWTW	SU3172019160	UNSPECIFIED	1,834	9.28
10	MINSTEAD WWTW	SU2830011030	UNSPECIFIED	Unspecified	9.47
11	BISHOPS WALTHAM WWTW	SU5414015990	CHEMICAL - PHOSPHATE STRIPPING	3,100	10.19
12	CANTERTON LANE BROOK WWTW	SU2758013690	BIOLOGICAL FILTRATION	9	10.31
13	MORESTEAD WWTW	SU4867027890	CHEMICAL - PHOSPHATE STRIPPING	9,933	13.44
14	GRAEMAR COTTAGES S. ENGLISH WWTW	SU2839022390	PACKAGE TREATMENT PLANT	20	13.91

ID	Discharge Name	NGR	Treatment	Dry Weather Flow (m^3/day)	Distance to nearest CZ (km)
15	DUNBRIDGE WWTW	SU3188025940	BIOLOGICAL FILTRATION	19	14.95
16	KINGS SOMBORNE WWTW	SU3373028750	CHEMICAL - PHOSPHATE STRIPPING	972	16.83
17	HARESTOCK WASTEWATER TREATMENT WORK	SU4928031420	CHEMICAL - PHOSPHATE STRIPPING	6,330	16.97
18	WHITEPARISH WWTW	SU2411022540	TERTIARY BIOLOGICAL	367	17.23
19	REDLYNCH WWTW	SU2189020020	BIOLOGICAL FILTRATION	290	17.8
20	STOCKBRIDGE WWTW	SU3534034440	CHEMICAL - PHOSPHATE STRIPPING	231	20.97
21	EAST GRIMSTEAD WWTW	SU2303027650	BIOLOGICAL FILTRATION	690	21.42
22	NEW ALRESFORD WWTW	SU5896030690	BIOLOGICAL FILTRATION	1,153	21.49
23	GRATTON CLOSE SUTTON SCOTNEY WWTW	SU4670039690	BIOLOGICAL FILTRATION	50	24.54
24	FULLERTON WASTEWATER TREATMENT WORK	SU3816039170	CHEMICAL - PHOSPHATE STRIPPING	19,291	24.55
25	SADDLERS CLOSE SUTTON SCOTNEY WTW	SU4648039870	PACKAGE TREATMENT PLANT	Unspecified	24.69
26	CHILBOLTON WWTW	SU3865039460	CHEMICAL - PHOSPHATE STRIPPING	294	24.72
27	BARTON STACEY WWTW	SU4334041990	CHEMICAL - PHOSPHATE STRIPPING	1,746	26.69

ID	Discharge Name	NGR	Treatment	Dry Weather Flow (m^3/day)	Distance to nearest CZ (km)
28	EVANS CLOSE OVER WALLOP WWTW	SU2790038520	BIOLOGICAL FILTRATION	86	28.1

The 2015 sanitary survey review identified a total of 47 continuous water company discharges in the catchment, and reported that Woolston (ID 5 in Table 3.1), Millbrook (ID 2) and Slowhill Copse (ID 4) Wastewater Treatment Works (WwTWs) all had an impact on water quality. No recent upgrades to these works were planned beyond the addition of nitrogen removal at Woolston WWTW. The EA confirmed during initial consultations that these works were completed in May 2019, and that UV disinfection was due to be installed at Millbrook and Slowhill Copse WWTWs by the end of 2023. These works should all reduce the negative impact that the discharges have on the shellfishery as they should reduce the faecal loading they cause. The main impacts will have occurred within CZs at the northern end of the estuary such as Eling and Weston Shelf, as these are closest CZs to the WWTWs with planned upgrades. Five continuous water company discharges are due to have their permits revoked in either 2024 or 2025, but the nearest of these to the BMPA is Bishops Waltham WWTW (ID 11) which is more than 10 km from the closest CZ (*Hamble Estuary*). The impact of these changes is expected to be minimal as any reduction in loading at the discharge location will be masked by the *E. coli* die off/dilution before contaminated waters reach the CZ.

In addition to the continuous discharges, the 2015 sanitary survey review identified a series of intermittent outfalls discharging in the Southampton Water BMPA. 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 and 2021 was published by the Environment Agency in March 2021 and in March 2022, respectively (Environment Agency, 2022). Details of the EDM data from 2021 for those discharges in the catchment are presented in **Error! Reference source not found.** and Appendix I.

The 2015 review identified 129 intermittent discharges in the Southampton Water catchment, and reported that the most significant discharges in terms of the contamination they contribute to the shellfishery were Bursledon STW storm overflow on the Hamble, Chickenhall Eastleigh WwTW storm overflow Imperial Road Mount Pleasant CEO and Woolston WwTW storm overflow on the River Itchen; and the Millbrook and Slowhill Copse WwTWs storm overflow in the north west of Southampton Water (within the *Eling* CZ). A comparison of the EDM data for 2012 and 2021 is presented in Table 3.2. The continuous discharge at Bursledon STW was decommissioned in 2014, but the storm discharge is still

active and now referred to as the 'Hamble Lane Bursledon Wastewater PS'. The data presented in Table 3.2 suggest that in general other discharges spilled less frequently in 2021 than in 2012, suggesting that the impact may have reduced slightly. Spills from Millbrook WwTW and the Bursledon PS occurred more frequently in 2021 than 2012, and so additional consideration should be given to these discharges in any updated sampling plan.

Table 3.2 Comparison of EDM summary information for key intermittent discharges in the Southampton Water catchment.

Discharge Name	Number of spills in 2012	Number of Spills (duration in hrs) in 2021
Bursledon STW (now Hamble Lane Bursledon Wastewater PS)	32	38 (464.17)
Chickenhall Eastleigh WwTW	21	20 (127.9)
Imperial Road Mount Pleasant CEO	15	12 (11.4)
Woolston WwTW	29	23 (128.0)
Millbrook WwTW	39	53 (574.4)
Slowhill Copse WwTW	52	37 (367.1)

During initial consultations, the EA advised of the investigations into intermittent discharges operated by the Water Company in the area. Assets considered as part of this investigation of relevance to the bacteriological health of the Southampton Water BMPA were Slowhill Copse WWTW, Millbrook WWTW, Ashlett Creek WWTW, Portswood WWTW and Woolston WWTW. The investigations found that assets in the area have made storm discharges in excess of the design criteria standard of 10 'significant' (50 m^3) discharges a year over a 10-year average. During initial consultations, the EA stated that it was therefore likely that assumptions about the frequency and duration of intermittent discharges in this area were incorrect. The EA investigation covered the period 2010 – 2015, and no EDM data was published for this period to facilitate comparison. There is no evidence that the EDM return for 2021 is incorrect. In July 2022, Woolston WwTW was upgraded to treat higher flows (reducing spills) through the addition of a new membrane, and further reductions in spills are due by 2024. The EA also advised that storm tank capacity will be increased at several discharges in coming years; Ensign Park CSO by February 2023, Ashlett Creek WwTW storm overflow by December 2024, Slowhill Copse WwTW storm overflow by March 2025. These upgrades should reduce the impact that these intermittent discharges have on the bacteriological health of the shellfishery by reducing the frequency that spills occur.

In addition to water company owned discharges, privately owned discharges require consideration in any assessment of contamination sources affecting a fishery. GDPR rules prevent inclusion of specific information relating to private discharges, although their locations are presented in Figure 3.2. This figure shows that many such discharges remain, although as the main locations of these have not changed since the 2015 Sanitary Survey

Review, no further consideration is required in the updated sampling plan as they are unlikely to have a significant impact on the bacteriological health of the shellfishery.

There have been several upgrades to the wastewater treatment network of the Southampton Water catchment since the 2015 sanitary survey review was published. These works should have reduced the impact of this source of pollution, although it remains a potentially significant source. Furthermore, investigations by the EA between 2010 - 2015 found a significant number of non-compliant spills from intermittent discharges. This means that additional consideration should be given to the presence of water company infrastructure in the Classification Zones of the BMPA. The CZs most likely to be significantly affected by water company infrastructure are the CZs at the northern end of the estuary, *Eling* and *Weston Shelf*, due to their proximity to water company assets.

3.3 Agricultural Sources

The 2015 sanitary survey review cites livestock population data based on the 2007 and 2013 Agricultural Censuses. To allow subsequent comparison, a data request was made to the Farming Statistics Office of the Department for Environment, Food and Rural Affairs (DEFRA) for livestock populations within the catchment present in Figure 1.1 for 2016 and 2021, the next two census years. **Error! Reference source not found.** shows the changes in livestock populations within the catchment between 2016 and 2021.

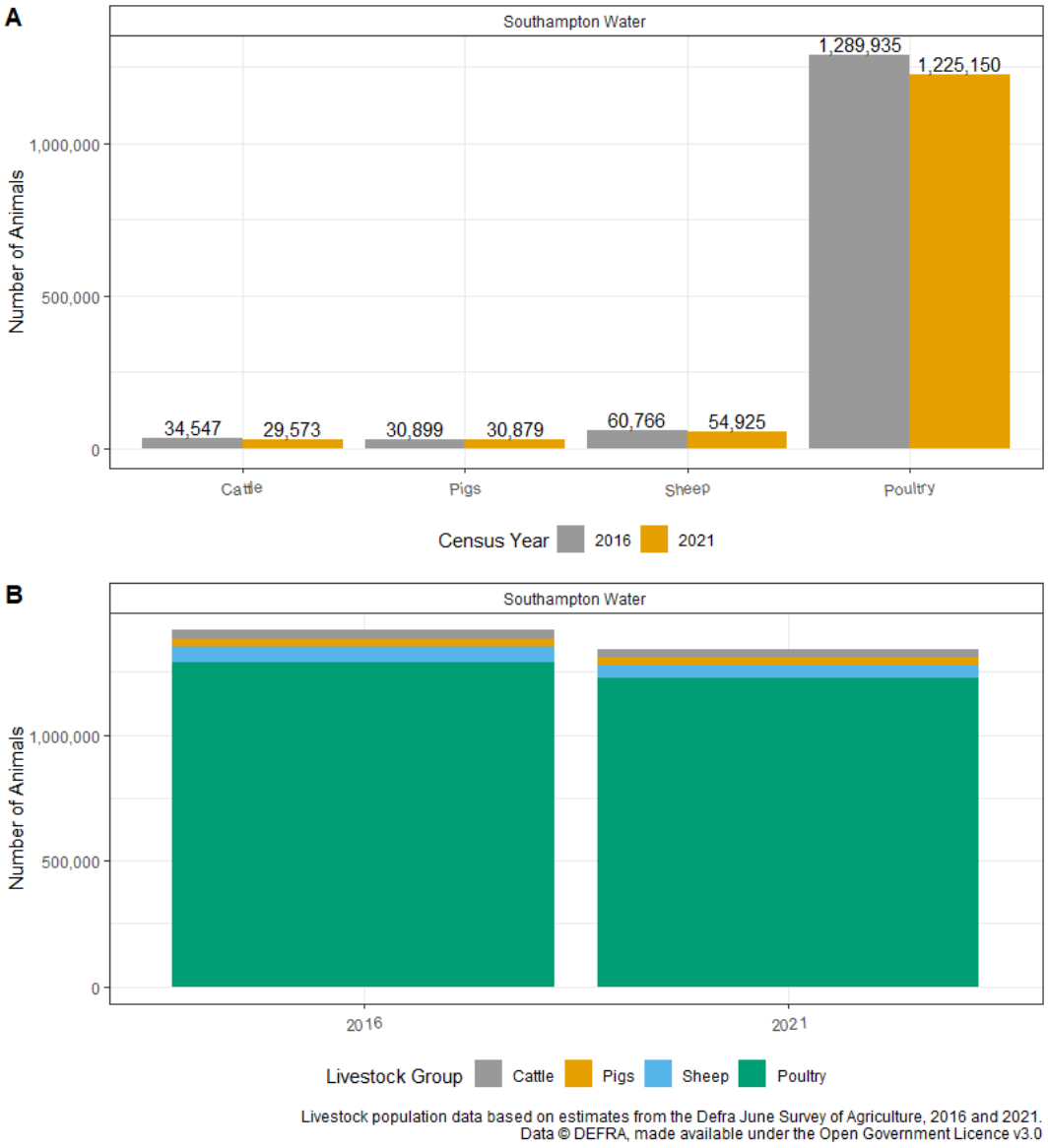
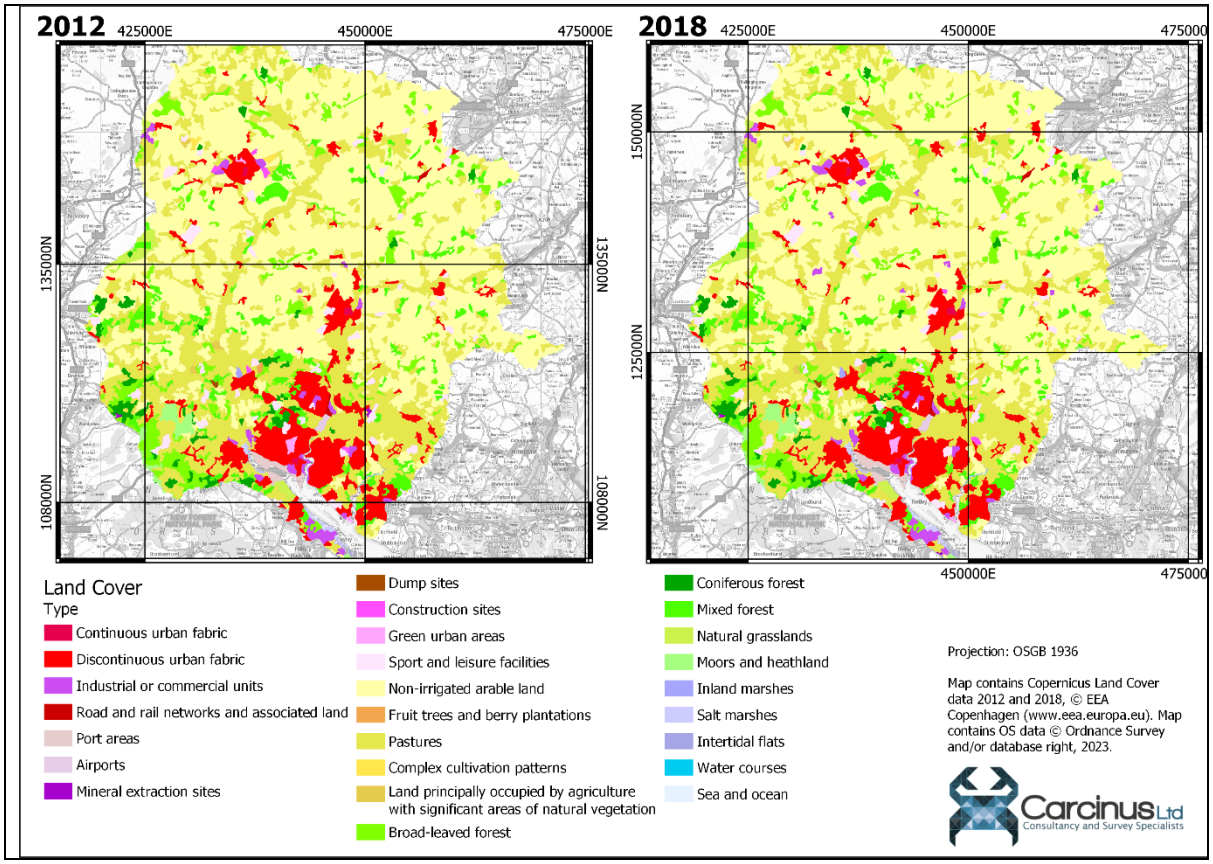


Figure 3.3 Changes in livestock populations within the Southampton Water catchment. Panel A shows populations broken down by different livestock groups and panel B should the aggregated population.

The data show that livestock populations have remained generally stable, but there has been a slight decrease in all groups. The dominant group in terms of population size continues to be poultry, with 10 times the population of the other three groups combined. It should be noted that the June Survey[3] 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.

[3] 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.

The principal route of contamination of coastal waters by livestock is surface runoff carrying faecal matter. The change in land cover in the catchment between 2012 and 2018 is shown in **Error! Reference source not found.**. The figure shows that whilst a significant proportion of the upper catchment remains reserved for agricultural purposes, most of the land immediately surrounding the Classification Zones continues to be urban or urban associated land types. Run-off from the agricultural areas in the upper reaches of the catchment will reach the BMPA through the main rivers in the area, the Test, Itchen and Hamble. However, any contamination will experience a significant degree of either bacterial die off and dilution before reaching the CZs. As such, there is expected to be minimal impact from this source of contamination on the bacteriological health of the BMPA.



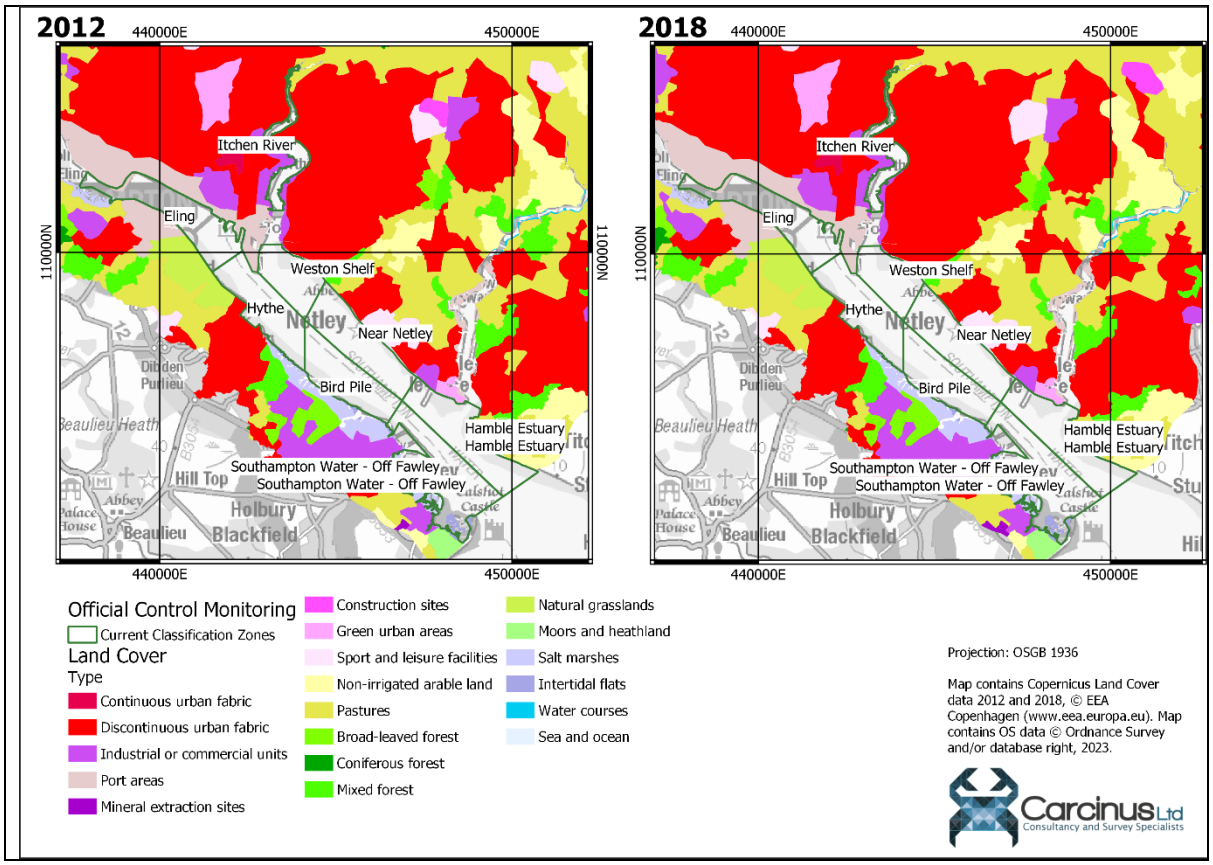


Figure 3.4 Changes in land cover in the vicinity of the Southampton Water catchment. Top panel shows land cover in the whole catchment and bottom panel shows land cover in the areas immediately surrounding the CZs.

Whilst there have been some decreases in the livestock population sizes across the catchment, the overall risk from this source of pollution is still considered to be low, given the very limited extent of agricultural land immediately adjacent to the shellfishery. No modifications to the sampling plan are required to account for this source of contamination.

3.4 Wildlife

Southampton Water contains a variety of habitats that support a significant diversity of wildlife species. The 2015 sanitary survey review identifies that the most significant wildlife aggregation in terms of its impact on shellfish hygiene was overwintering waterbirds (waders and wildfowl). Contamination from this group can be significant given that they frequently forage (and defecate) directly on intertidal shellfish beds.

Figure 3.5 shows the temporal trend in total overwintering waterbird counts from the winter of 2009/2010 to 2019/2020 (the most recent for which data are available). It shows that the most dominant group for the past 10 years have been wildfowl, with significant numbers of waders also. It also shows that current populations are down compared to the time of the original sanitary survey. The average total count over the five winters to 2014/15 was 14,101 birds, but in the five winters to 2019/2020 this was only 12,742, a

decrease of 9.4%. Within this total population are nationally significant populations of Brent Goose, Black-tailed Godwit and Greenshank.

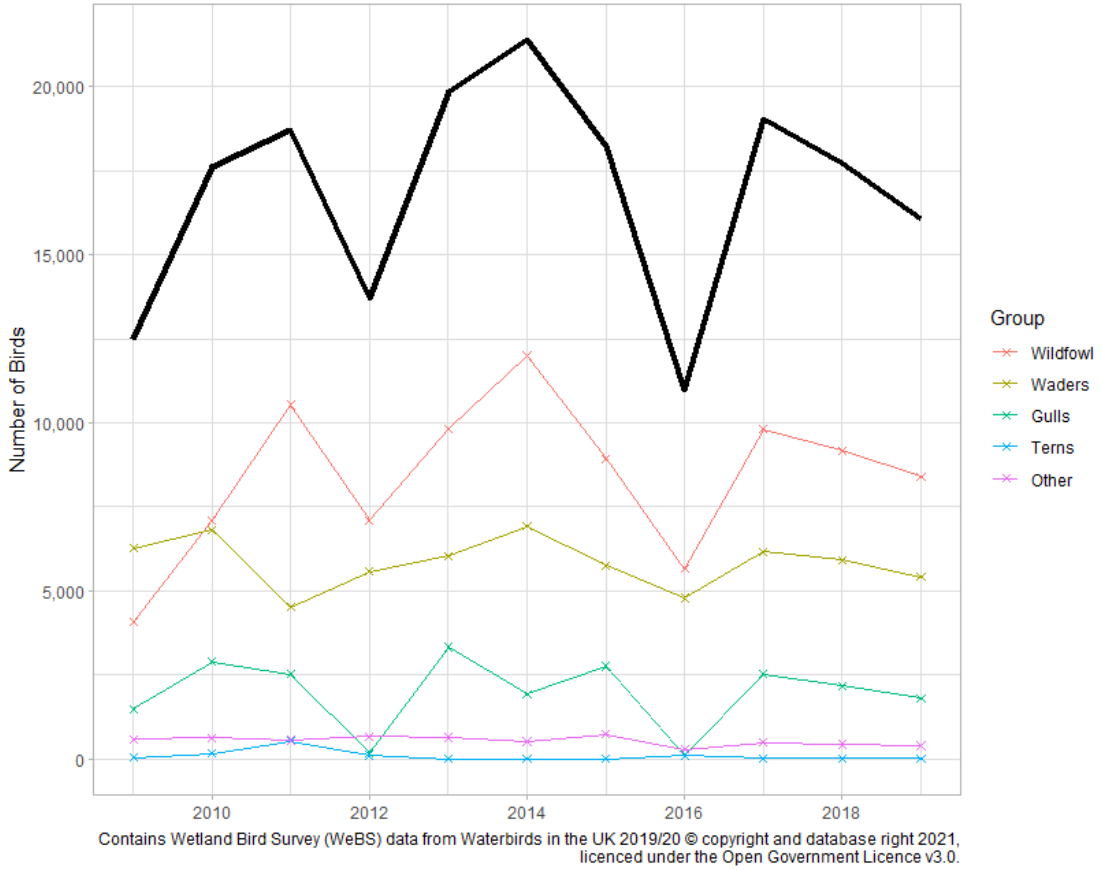


Figure 3.5 Temporal trend in waterbird counts at Southampton Water. Data from the Wetland Bird Survey (Frost et al.*, 2021).*

The largest aggregations of waterbirds, and therefore the highest risk of contamination, will occur in winter months. In general, it is likely that higher aggregations of waterbirds occur in the intertidal areas compared to the subtidal. The precise distribution of waterbirds within the estuary is challenging to predict, as it 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 2015 sanitary survey review was published.

There is a small population of harbour seals (*Phoca vitulina*) in the wider Solent, with haul out sites in 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.

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 Southampton Water 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 original sanitary survey. Their geographical positions are presented in Figure 3.6.

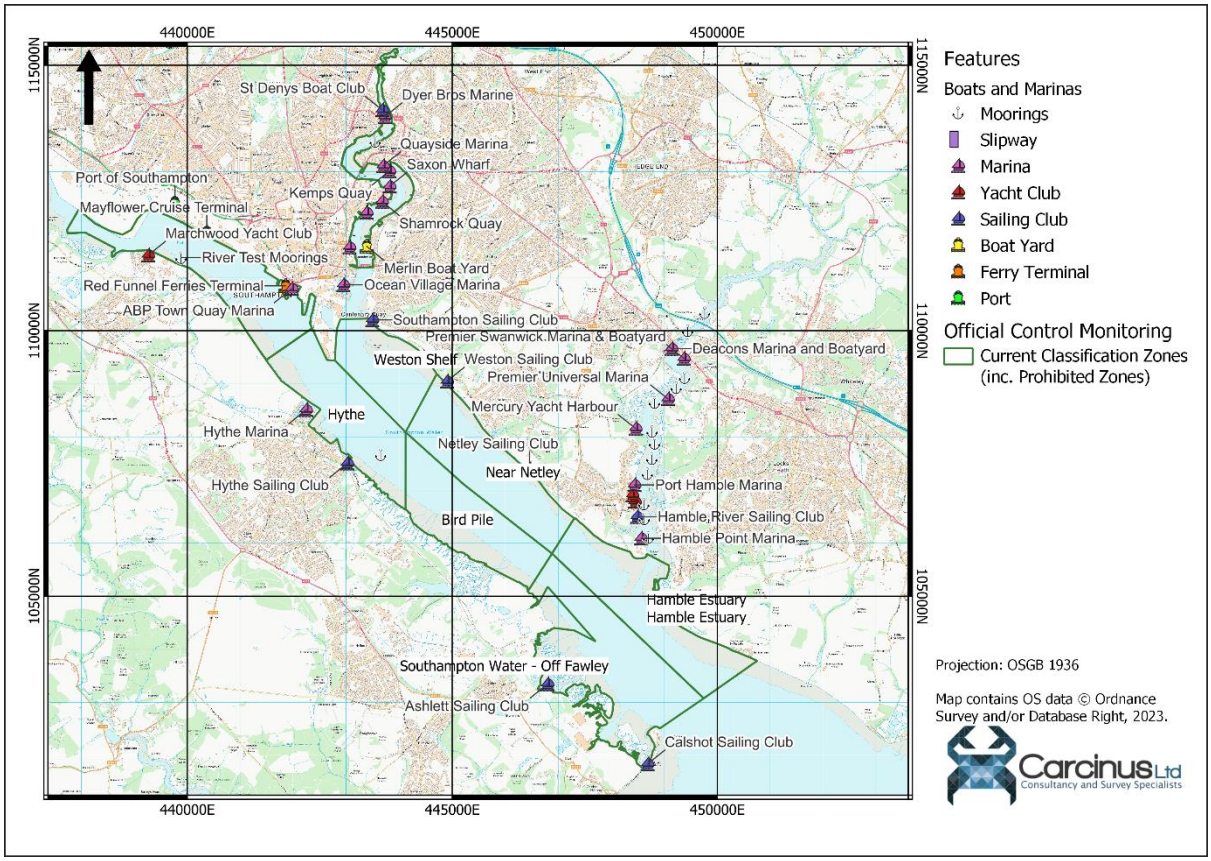


Figure 3.6 Locations of boats, marinas and other boating activities in the vicinity of the Southampton Water BMPA.

Southampton Water continues to receive a significant volume of boating activity. The 2015 Review describes that planning submission had been granted for a new marina off Marchwood (on the western side of the estuary), but it appears that the application (New Forest District Council Planning Number 14/11429) has been withdrawn.

There are still a large number of marinas (>10) and hundreds of moorings throughout the estuary, with pump out facilities at the Hythe Marina and Port Hamble Marina. Vessels of a sufficient size to contain onboard toilets will make overboard discharges from time to time, particularly when moving through the main navigational channels or anchored/moored overnight. The greatest risk of this source of contamination will occur in summer months

when vessel numbers are highest. It is impossible to define exactly when overboard discharges will be made, and so it is challenging to account for this source of pollution in any updated sampling plan.

There continues to be an international ferry and freight port within Southampton Water, the Port of Southampton. However, no impacts from commercial vessels are expected, as the legislation governing the overboard discharges from ships[4] have not changed since the original sanitary survey was published. This legislation prevents commercial vessels from making overboard discharges within 3 nm of land.

Overall, the risk of contamination from recreational boats remains relatively high within Southampton Water, particularly in summer months. However, it remains challenging to account for this reliably in any updated sampling plan and so the recommendations made in the original sanitary survey to account for this remain valid.

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. Areas at greatest risk of this source of contamination are areas of urban fabric. During consultations, the EA stated that there was no direct evidence for these, but that in urban areas with separate sewerage systems misconnections are likely. We understand that the water company has been undertaking misconnection investigations in Southampton and have found and resolved several in the last year, although no further information is available. The main areas with the potential to contribute contamination from utility misconnections is the City of Southampton and its surrounding suburbs as they are positioned immediately adjacent to the shellfishery.

Some impacts from dog fouling are expected, as dog walking is common along the footpaths and beaches that flank the shorelines on the eastern side of the estuary and around Southampton. Large saltmarsh areas on the west of the estuary will reduce the level of dog walking in these areas. Overall, the risk of this source of contamination is considered to be similar to that described in the original sanitary survey and no update to the sampling plan is required on this basis.

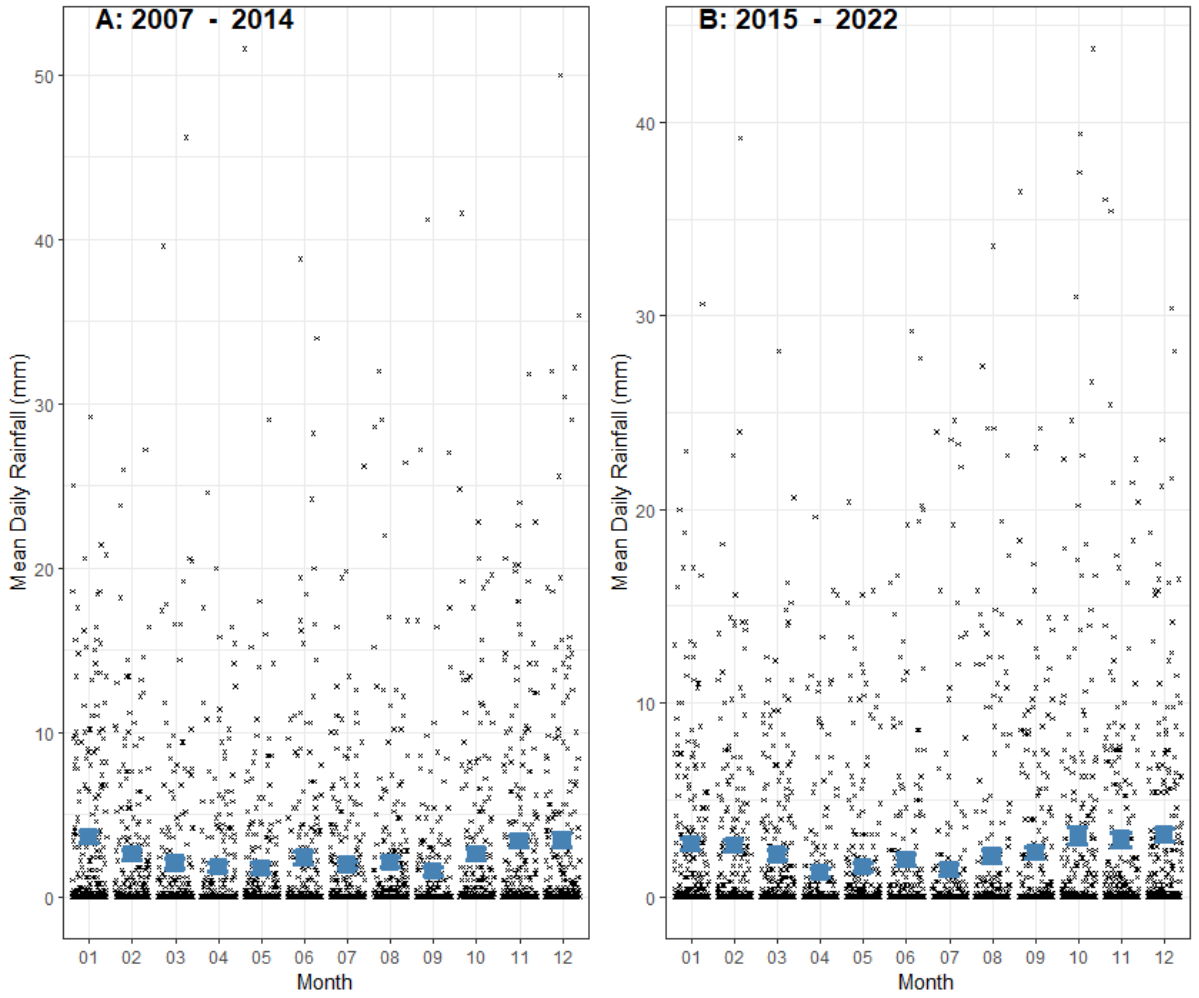
4 Hydrodynamics/Water Circulation

The original sanitary survey describes that the bathymetry within Southampton Water changed only minimally from 2009 – 2014, and no significant changes to the bathymetry of the area have occurred since then. Tidal circulation is likely to be the dominant force of water circulation within the BMPA, with the fluvial plume from the rivers that drain to the estuary carrying contamination downstream, particularly during an ebbing tide. The recommendations made in relation to water circulation in the 2015 sanitary survey review remain valid.

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

5 Rainfall

Rainfall data for the Testwood Tipping Bucket Rain gauge (TBR) (ID: 330973) were requested from the Environment Agency for the period 2000 – Present. This station was chosen as it is geographically the closest monitoring station to the BMPA, located 7 km northwest of the CZs, in the River Test. These data were subdivided into 2007 – 2014 (pre sanitary survey) and 2015 – 2022 (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 average daily rainfall totals per month are shown in Figure 5.1.



Archive Daily Rainfall from the Testwood TBR monitoring station (#330973) at NGR: SU 35447 15066
Data provided by the Environment Agency, licenced under the Open Government Licence v3.0

Figure 5.1 Mean daily rainfall per month at the Testwood TBR monitoring station (NGR: SU 35447 15066) for the period (A) 2007 – 2014 and (B) 2015 - 2022.

Table 5.1 Summary statistics for rainfall for the period preceding and following the original sanitary survey, from the Testwood TBR monitoring station.

Period	Mean Annual Rainfall (mm)	Percentage Dry Days	Percentage Days Exceeding 10 mm	Percentage Days Exceeding 20 mm
2007 - 2014	881.575	48.836	27.379	16.906
2015 - 2022	817.875	50.017	25.716	15.913

The rainfall data show that the annual rainfall levels in the catchment have decreased, with more than half of days in 2015 – 2022 having no rainfall whatsoever. Two sample t-tests indicated that there was no significant difference ($p > 0.05$) in the mean daily rainfall per month for the 2007 – 2014 and 2015 – 2022 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 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 Summary Statistics and geographical variation

The mean results of Official Control monitoring for *E. coli* concentrations at RMPs samples in the Southampton Water 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 19 RMPs have been sampled within this RMP since 2010, although no meaningful data was available for three of them, either due to only one sample being collected (Bird Pile, B21AF) or data being collected for EA investigations rather than for Official control purposes. Table 6.1 does not provide the data for these RMPs. Only 9 RMPs are currently in use, although there have been no changes to the RMPs sampled in this BMPA since 2013, prior to the publication of the 2015 sanitary survey review.

Monitoring results from RMPs are relatively high, with 14 of the 16 RMPs with available data returning more than 60% of their results above 230 *E. coli* MPN/100 g, and nearly half returning more than 30% of their results above 4,600 *E. coli* MPN/100 g. Nine of the 16 RMPs have returned at least one result above 46,000 *E. coli* MPN/100 g, contributing to a

number of historical prohibited designations in CZs in the area. When considered spatially, there does appear to be a trend of increasing *E. coli* results in upstream RMPs, reflecting the likely concentration gradient within Southampton Water. As such, in the absence of significant point-source contamination in a given Classification Zone, a general approach of positioning RMPs at the up-estuary end of CZs should be taken. In instances where RMPs are co-located for more than one species, *Tapes* spp. samples have contained higher *E. coli* concentrations, although in some cases there is no temporal overlap so the comparisons that can be drawn are limited.

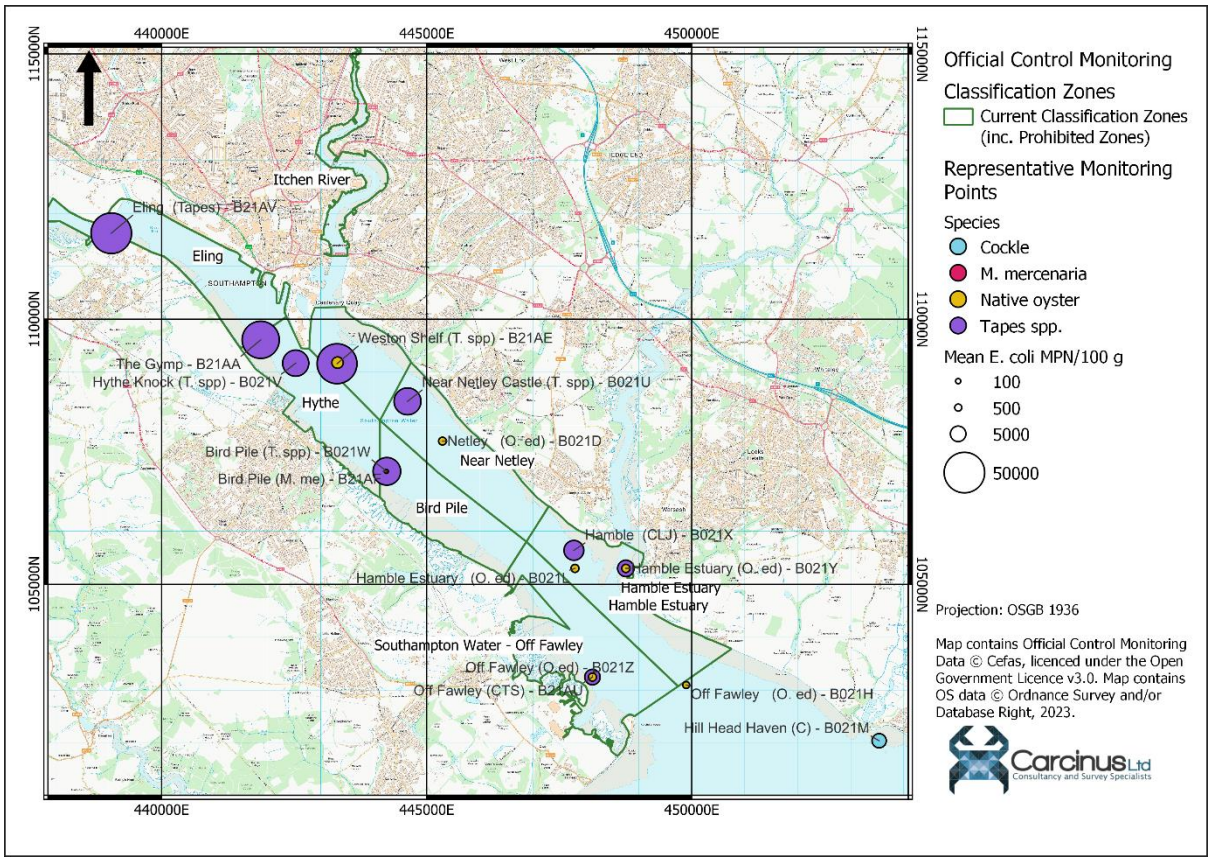


Figure 6.1 Mean E. coli results from Official Control Monitoring at bivalve RMPs in the Southampton Water BMPA.

Table 6.1 Summary statistics of Official Control monitoring undertaken within the Southampton Water BMPA since 2010.

RMP (Species)	NGR	Species	No. Samples Collected	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Bird Pile (T. spp) - B021W	SU44250713	*Tapes* spp.	134	03/03/2010	07/11/2022	17617.99	18	920000	93.28	43.28	4.48
Eling (Tapes) - B21AV	SU39051162	*Tapes* spp.	31	15/04/2019	07/12/2022	37927.42	110	920000	96.77	35.48	6.45
Hamble (CLJ) - B021X	SU47780564	*Tapes* spp.	13	03/03/2010	09/05/2011	8723.846	330	70000	100.00	30.77	7.69
Hamble Estuary (O. ed) - B021L	SU47800530	Native oyster	2	25/01/2010	02/03/2010	780	460	1100	100.00	0.00	0.00
Hamble Estuary (O. ed) - B021Y	SU48760530	Native oyster	151	12/04/2010	05/12/2022	845.1391	18	24000	43.71	2.65	0.00
Hamble Estuary (T. spp) - B21AT	SU48760530	*Tapes* spp.	70	06/02/2017	05/12/2022	5733.886	68	92000	75.71	18.57	4.29
Hill Head Haven (C) - B021M	SU53540205	Cockle	8	24/02/2010	13/05/2011	4055	170	18000	75.00	25.00	0.00
Hythe Knock (T. spp) - B021V	SU42530917	*Tapes* spp.	62	03/03/2010	07/12/2022	15702.58	140	350000	95.16	43.55	6.45
Near Netley Castle (T. spp) - B021U	SU44640845	*Tapes* spp.	123	03/03/2010	07/12/2022	16734.1	18	540000	91.87	38.21	8.94
ANetley (O. ed) - B021D	SU45300770	Native oyster	9	25/01/2010	11/10/2010	727.7778	130	1700	77.78	0.00	0.00

RMP (Species)	NGR	Species	No. Samples Collected	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Off Fawley (O. ed) - B021H	SU49900310	Native oyster	3	18/01/2010	01/03/2010	443.3333	50	790	66.67	0.00	0.00
Off Fawley (CTS) - B21AU	SU48130325	*Tapes* spp.	13	06/03/2017	07/12/2022	4962	78	54000	61.54	7.69	7.69
Off Fawley (O.ed) - B021Z	SU48130325	Native oyster	150	13/04/2010	05/12/2022	805.88	18	16000	47.33	3.33	0.00
The Gymp - B21AA	SU41870961	*Tapes* spp.	10	07/07/2010	09/05/2011	31993	40	180000	70.00	50.00	30.00
Weston Shelf - B021S	SU43320918	Native oyster	32	12/04/2010	04/03/2013	2305.938	50	9200	90.63	15.63	0.00
Weston Shelf (T. spp) - B21AE	SU43310916	*Tapes* spp.	77	07/07/2014	07/12/2022	36743.1	18	160000	90.91	40.26	9.09

Figure 6.2 - Figure 6.4 present box and violin plots of *E. coli* monitoring at RMPs within the Southampton Water BMPA. These boxplots include Official Control data only. No plot is provided for the single *M. mercenaria* RMP as only one sample was collected. 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).

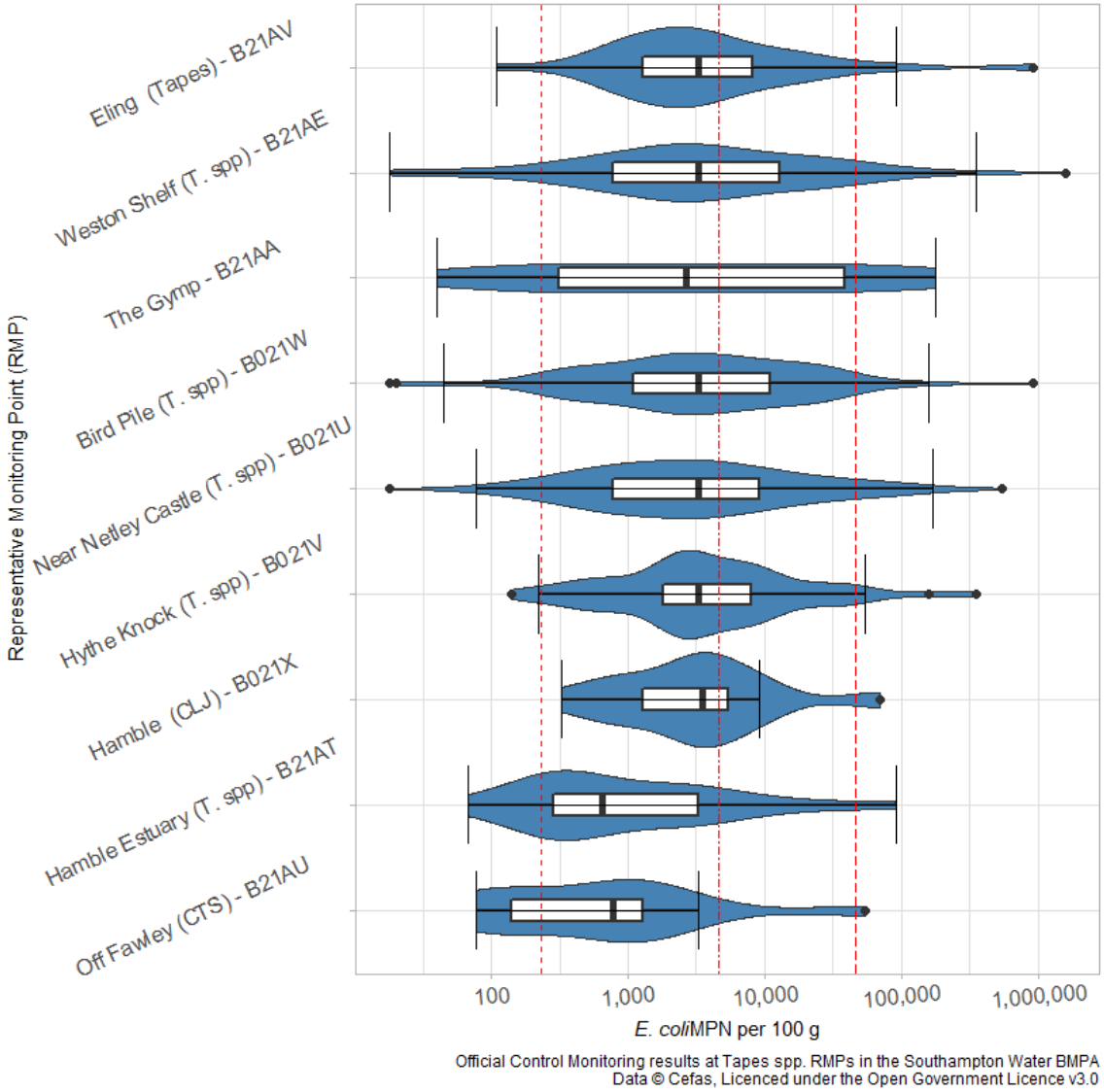


Figure 6.2 Box and violin plots of E. coli *concentrations at* Tapes *spp. RMPs in the Southampton Water BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers (points >1.5 x the interquartile range). 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).*

The highest median *E. coli* concentrations within *Tapes* spp. RMPs was found at The Gymp (B21AA) (Figure 6.2), situated at the northern end of the *Hythe* CZ, near the Port of Southampton. Seven of the nine *Tapes* spp. RMPs are active (only The Gymp B21AA and Hamble B021X are not active). Of these, the highest median concentration is at Eling B21AV, but no statistically significant differences in the monitoring data from *Tapes* spp. RMPs were found ($p > 0.05$), and all show a wide distribution in their data.

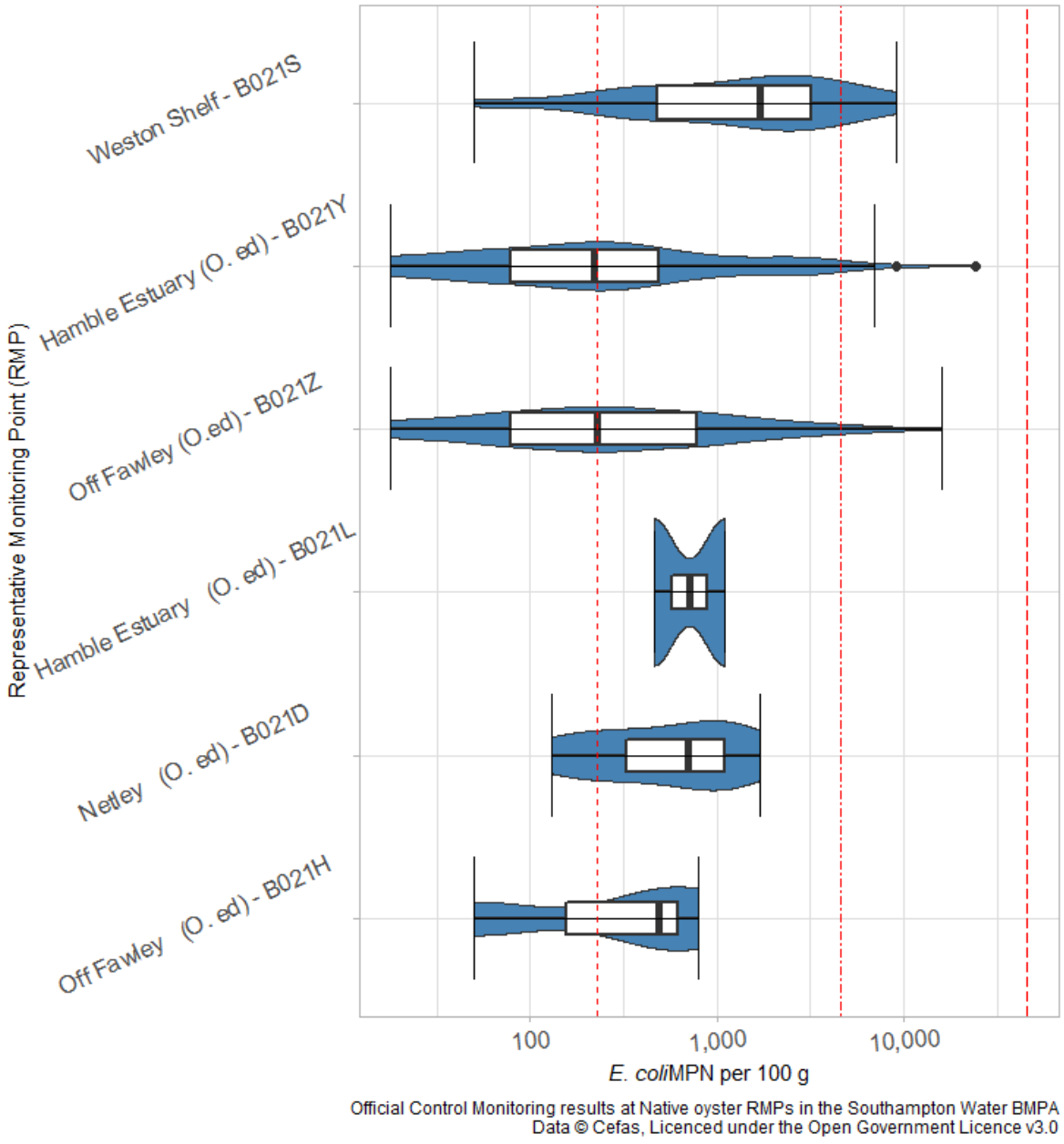


Figure 6.3 Box and violin plots of E. coli *concentrations at native oyster RMPs in the Southampton Water BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers (points >1.5 x the interquartile range). 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).*

The highest median *E. coli* concentration at native oyster RMPs was found at the Weston Shelf (B021S) RMP (Figure 6.3), which is situated near the mouth of the River Itchen. Results from this RMP were found to be significantly greater than results from the Hamble Estuary – B021Y (p = 0.004) and Off Fawley – B021Z RMPs (p = 0.003). These are the only two native oyster RMPs currently in use. The Off Fawley (B021Z) RMP is located approximately 250 m from the Ashlett Creek WWTW (ID1 in Table 3.1), which could explain the higher monitoring results from this RMP. No other statistically significant differences were found.

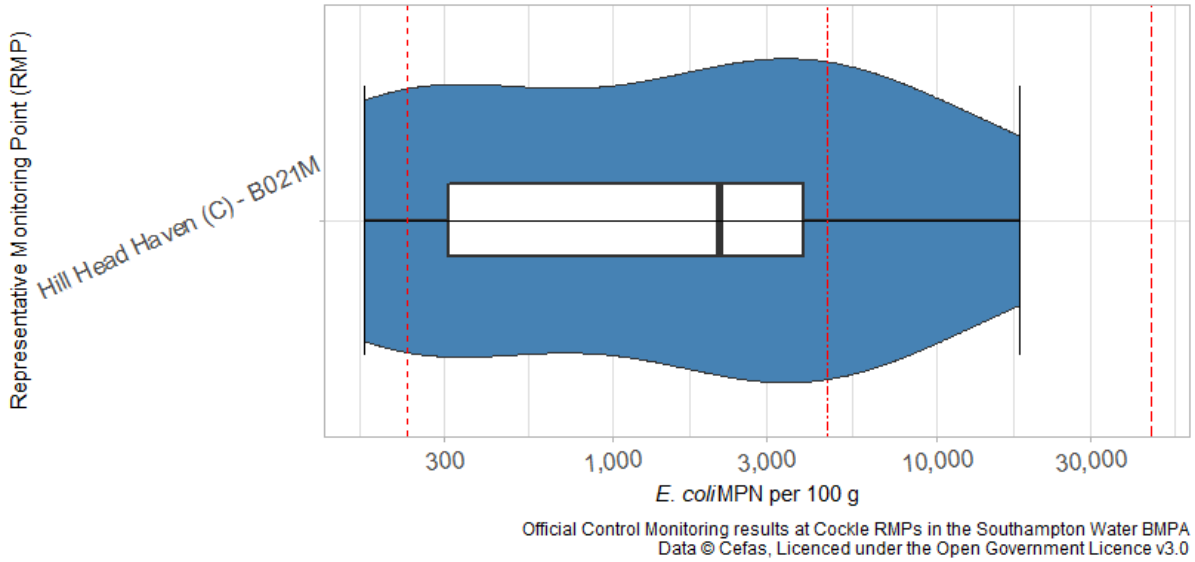


Figure 6.4 Box and violin plots of E. coli concentrations at cockle RMPs in the Southampton Water BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers (points >1.5 x the interquartile range). Boxplots 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).

Monitoring data is available for only one cockle RMP (B021) and so no comparison is possible, as it is not appropriate to compare between different species due to the differences in the rate of *E. coli* uptake.

6.2 Overall temporal pattern in results

The overall temporal pattern in shellfish flesh monitoring results for *Tapes* spp. clam, native oyster and cockle RMPS are shown in Figure 6.5, Figure 6.6 and Figure 6.7 respectively.

The monitoring data from *Tapes* spp. RMPs clearly indicate the rapid decline in shellfish flesh monitoring results in the vicinity of the Hamble (B021X) and The Gymp (B21AA) RMPs until sampling stopped in May 2011 (Figure 6.5). The trend lines fitted to the other RMPs to have been sampled since then, Hythe Knock (B021V), Near Netley Castle (B021U) and Bird Pile (B021W) have been more stable, sitting around the 4,600 MPN/100 g threshold. Shellfish flesh monitoring results at the Eling (B21AV) RMP have been increasing in recent months. The CZ (*Eling*) that this RMP is used to represent, was prohibited in January 2020

following a OC result above the maximum Class C limit. Monitoring restarted in June 2022 and in recent months monitoring results have been better, with only one result above 4,600 MPN/100 g. Shellfish flesh monitoring results from Hamble Estuary (B21AT) and Off Fawley (B21AU) RMPs, are improving, whereas results from other *Tapes* spp. RMPs remain stable.

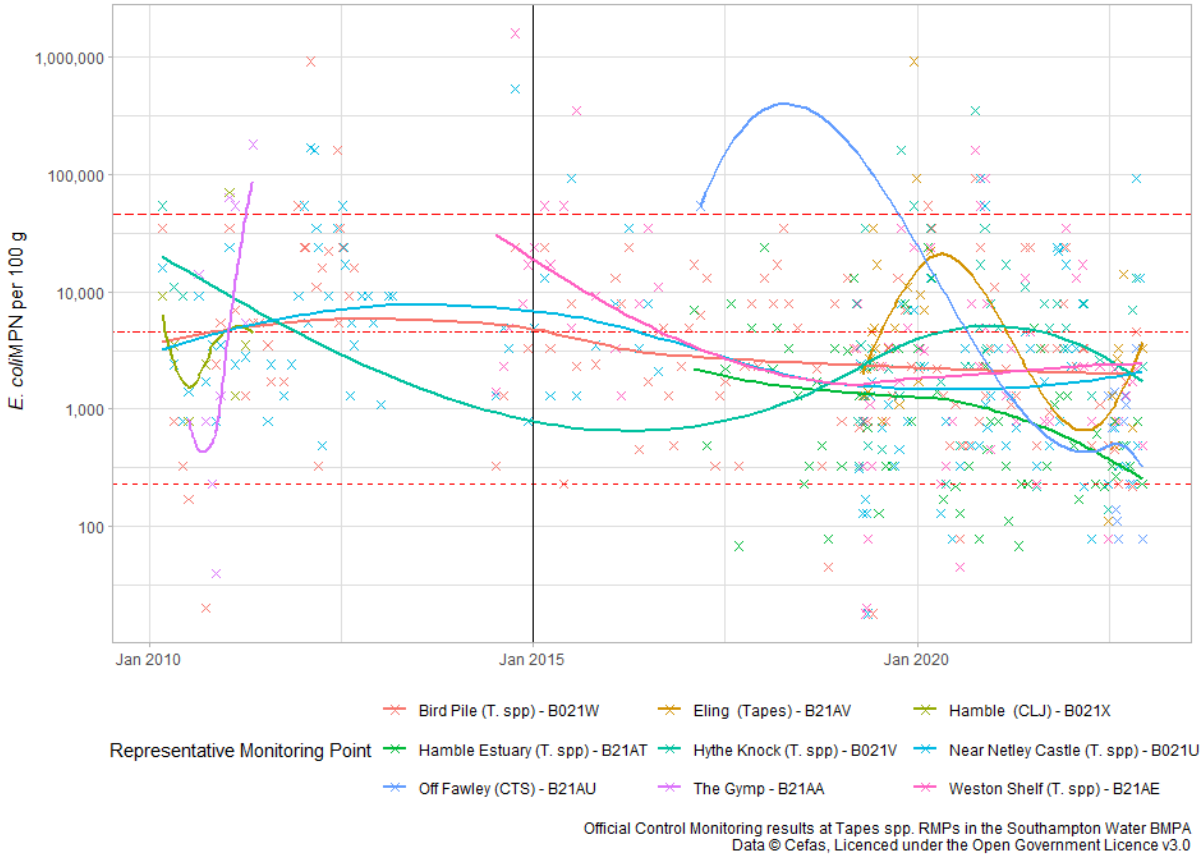


Figure 6.5 Timeseries of E. coli *levels at* Tapes *spp. clam RMPs sampled in the Southampton Water BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.*

A similar pattern to Official Control Monitoring results at *Tapes* spp. RMPs in 2010/2011 can be seen in the native oyster data (Figure 6.6). All four native oyster RMPs no longer sampled demonstrated a pattern of declining shellfish flesh monitoring results until sampling stopped (Hamble Estuary (B021L), Off Fawley (B021Z), Netley (B021D) and Weston Shelf (B021S)). Only two native oyster RMPs are currently sampled, and the trend lines fitted to these data suggest improving shellfish flesh monitoring results since then. It should be noted that the *E. coli* concentrations in *Tapes* spp. clams were much higher than those from native oyster RMPs.

The trend line fitted to the Official Control monitoring data from the Hill Head Haven RMP (Figure 6.7) indicates that shellfish flesh monitoring results steadily increased until 2011, when sampling at this RMP stopped.

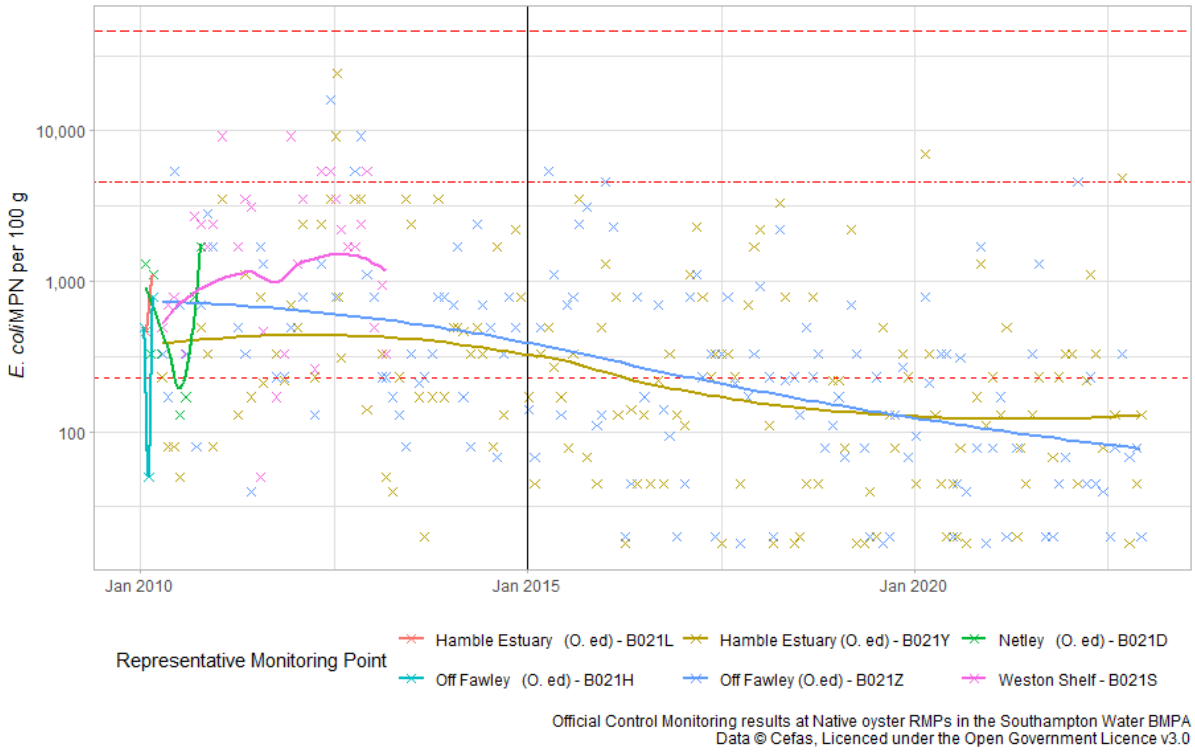


Figure 6.6 Timeseries of E. coli levels at native oyster RMPs sampled in the Southampton Water BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.

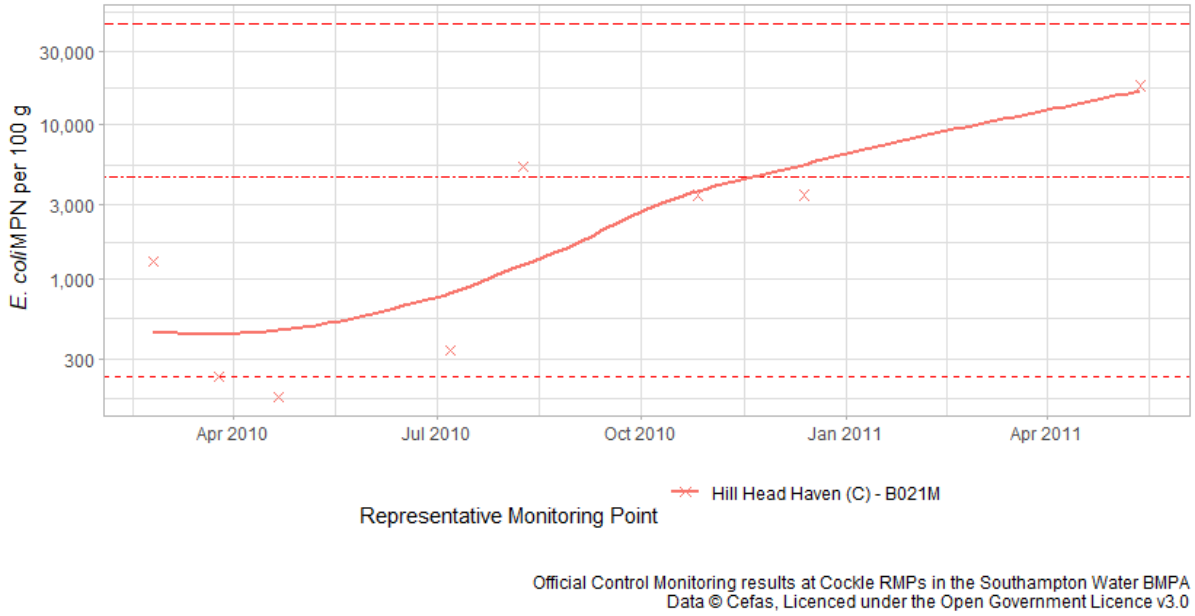


Figure 6.7 Timeseries of E. coli levels at cockle RMPs sampled in the Southampton Water BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g respectively.

6.3 Seasonal patterns of results

The seasonal patterns of *E. coli* levels at RMPs in the Southampton Water BMPA were investigated and are shown for *Tapes* spp. clams in Figure 6.8, native oysters in Figure 6.9 an cockles in Figure 6.10. 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.

Across most RMPs for all species, samples collected in winter months returned higher *E. coli* concentrations, particularly at Bird Pile B021W, Eling (B21AV) and Weston Shelf B021S. However, no significant differences in the data were found ($p > 0.05$).

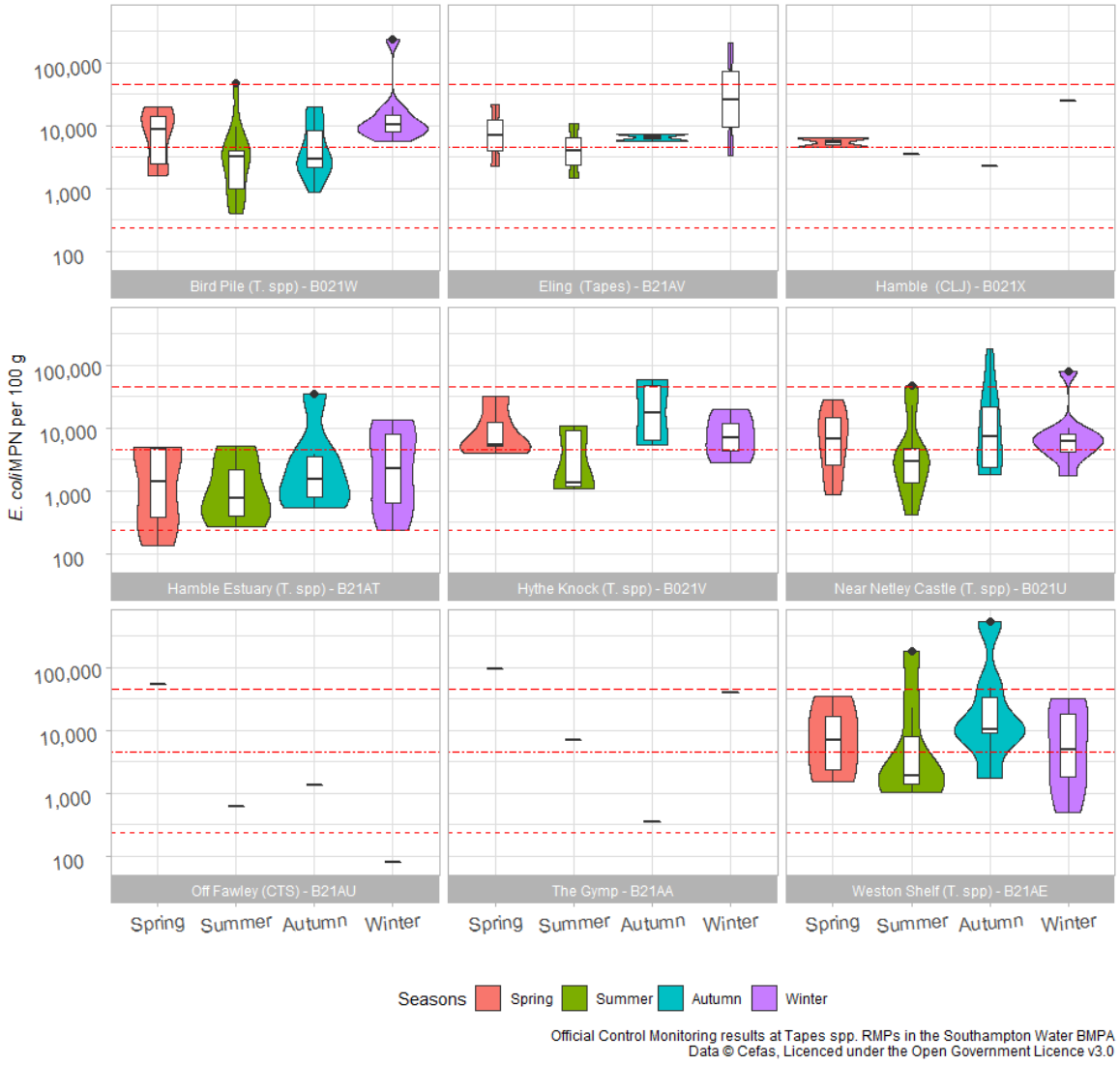


Figure 6.8 Box plots of E. coli levels per season at Tapes *spp. clam RMPs sampled within the Southampton Water BMPA. Boxplots are overlaid on violin plots of the data showing the distribution of the data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 MPN/100 g respectively.*

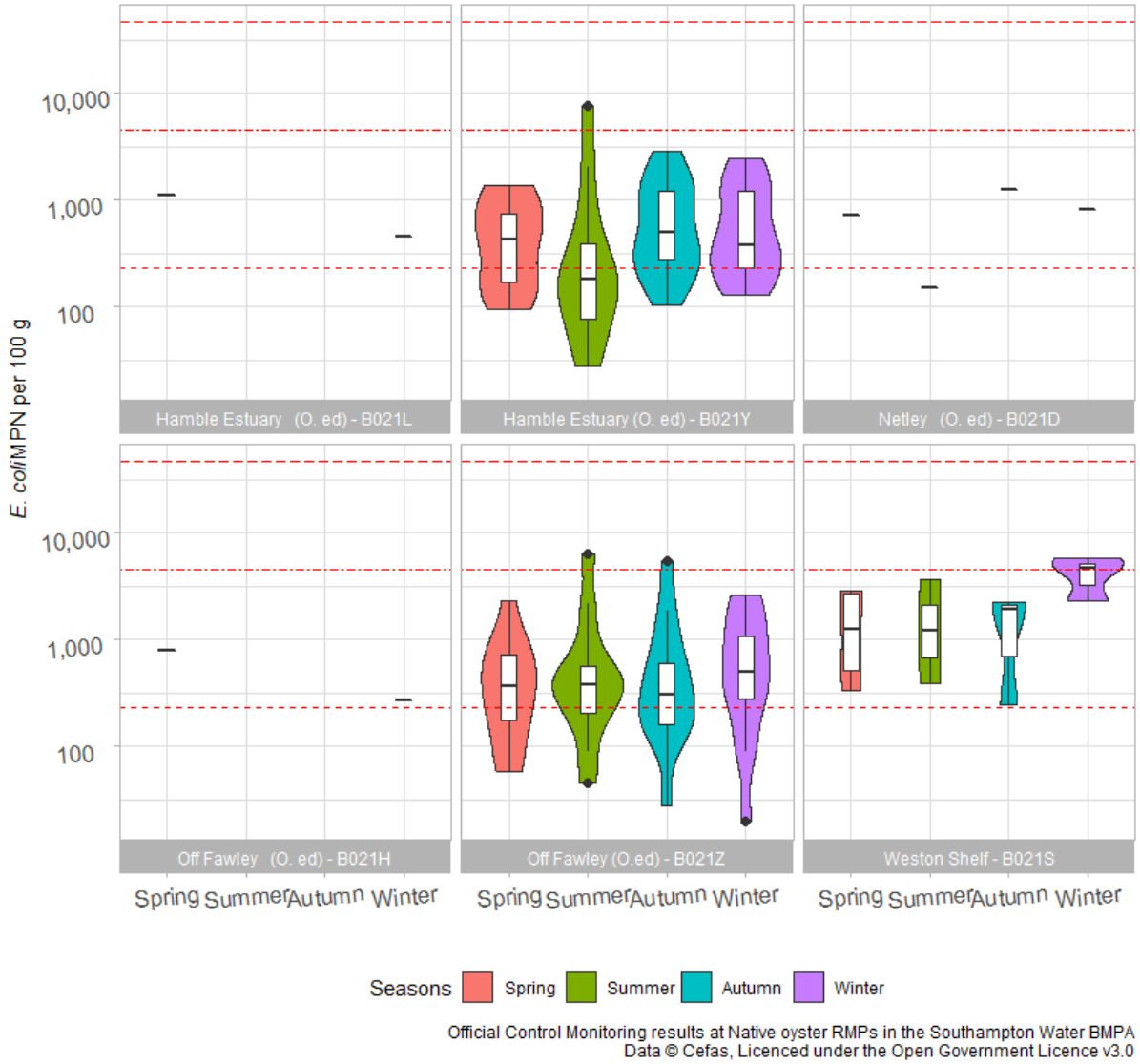


Figure 6.9 Box plots of E. coli levels per season at native oyster RMPs sampled within the Southampton Water BMPA. Boxplots are overlaid on violin plots of the data showing the distribution of the data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 MPN/100 g respectively.

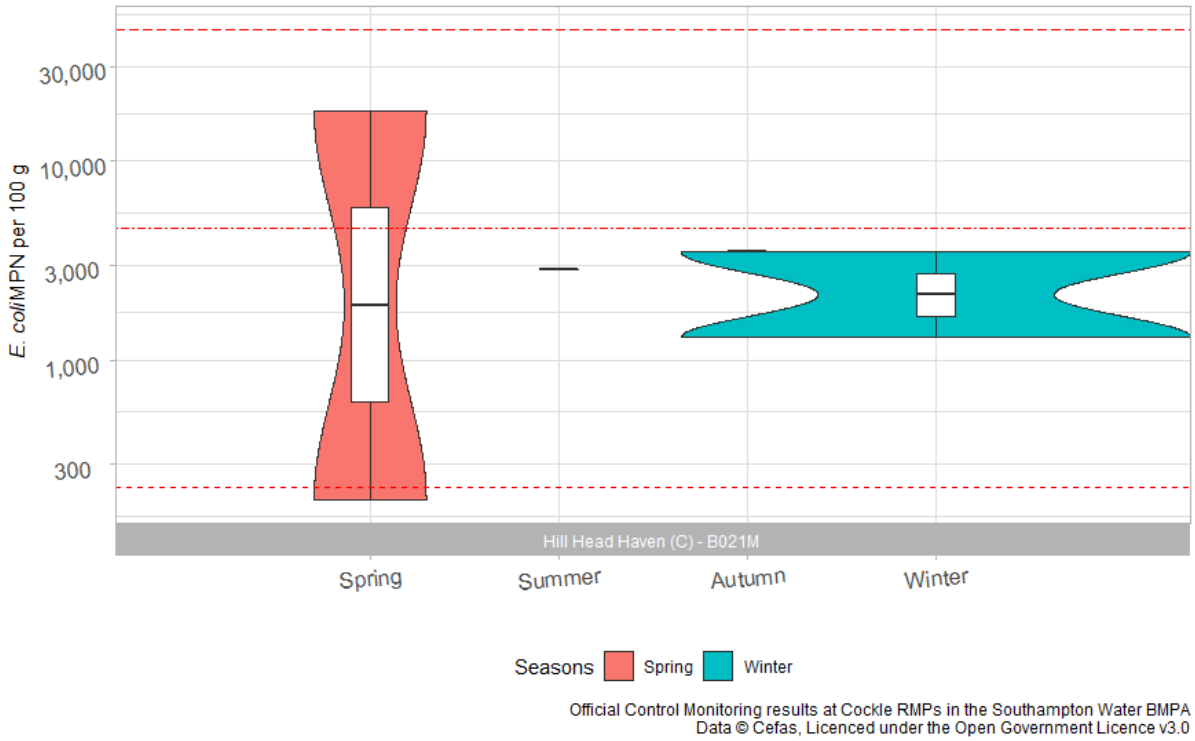


Figure 6.10 Box plots of E. coli levels per season at cockle RMPs sampled within the Southampton Water BMPA. Boxplots are overlaid on violin plots of the data showing the distribution of the data. Horizontal dashed lines indicate classification thresholds at 230, 4,600 and 46,000 MPN/100 g respectively.

6.4 Action States

Since the publication of the 2015 Sanitary Survey Review of Southampton Water, the following action states have been triggered within the BMPA:

- On 16 December 2019, a result of 920,000 *E. coli* MPN/100 g was recorded at Eling B21AV. Other results above classification limits were recorded in the area on the same date; 54,000 *E. coli* MPN/100 g at Hythe Knock B021V, 24,000 *E. coli* MPN/100 g at Weston Shelf B21AE and 7,000 *E. coli* MPN/100 g at Near Netley B021U. Subsequent Action State sampling returned results of 92,000 *E. coli* MPN/100 g and 1,700 *E. coli* MPN/100 g two and three weeks after the initial sample result.
- On 19 February 2020, a result of 54,000 *E. coli* MPN/100 g was recorded at Bird Pile B021W. A result of 7,000 *E. coli* MPN/100 g was also recorded at Hamble Estuary (B021Y) on the same date. Subsequent Action State sampling returned results of 24,000 and 35,000 *E. coli* MPN/100 g two and three weeks after the initial sample result.
- On 05 October 2020, results of 160,000 *E. coli* MPN/100 g at Weston Shelf B21AE, 92,000 *E. coli* MPN/100 g at Near Netley Castle B021U, Hamble Estuary B21AT and Bird Pile B021W were recorded. This represented all active *Tapes* spp. CZs in the BMPA at the time. Action State samples collected two weeks later recorded results

within classification thresholds, but samples a further week later recorded elevated results; 54,000, 92,000, 92,000 and 24,000 *E. coli* MPN/100 g, respectively.

- On 26 October 2021, a result of 24,000 *E. coli* MPN/100 g was recorded at Near Netley Castle B021U. The same result was recorded at the Weston Shelf B21AE RMP on the same date. Action State samples taken one and two weeks after the initial result returned results of 22,000 and 780 *E. coli* MPN/100 g respectively. .Some heavy rainfall and releases from CSOs in the area were recorded in the days previous, although too far in the past to warrant waiving the results.
- On 24 November 2021, a result of 24,000 *E. coli* MPN/100 g was recorded at Near Netley Castle B021U. No other high results were recorded in the area. Action state sampling on 15 December 2021 and 05 January 2022 returned results of 3,200 and 2,300 E. coli MPN/100 g respectively.

The investigations conducted following the Action State events described above suggest that there is often heavy rainfall and associated releases from intermittent discharges in the catchment that coincide with 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

Southampton Water is the estuary that extends from the confluence of the Test and Itchen Rivers down to its mouth between Calshot Spit and the Solent Breezes Holiday Park. Historically the BMPA has supported a significant shellfishery of various species, most notably native oysters. Currently the dominant fishery is *Tapes* spp. clams, although we understand from intelligence gained during the initial consultation stage that there is significant commercial interest in cockles. The BMPA has also suffered with high Official Control monitoring results for the past decade, with many of the Classification Zones in the estuary being Prohibited for some or all of that time.

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 2015 Sanitary Survey review was published. These data suggest that the population has grown by 6.34%, with increases in population density of the main urban centres, Southampton, Winchester and Andover. Most of the land surrounding the classification zones continues to be urban or urban-associated land types, particularly in the northern part of the estuary, and so the risk of urban runoff continues to be relatively high.

During initial consultations, the EA confirmed that some planned upgrades to water company owned assets in the area that were mentioned in the original sanitary survey review had taken place, and that further upgrades were planned for 2023 and 2024. These upgrades affect discharges in the north of Southampton Water, near the *Eling* and *Weston Shelf* CZs. Upgrades and improvements to intermittent discharges in the same areas have also taken place, and so the risk of bacteriological contamination from these sources should have reduced slightly. However, the water company responsible for management of the

assets in this BMPA were prosecuted in 2022 for a very large number of non-consented discharges. It is likely that EDM data are under reported and so additional consideration should be given to the presence of intermittent discharges in the vicinity of a CZ.

Livestock populations have fallen slightly since the 2015 review was published, although most of the land immediately surrounding the Classification Zones continues to be urban or urban associated land types. As such, there is expected to be minimal impact from this source of contamination on the bacteriological health of the BMPA.

Southampton Water supports significant populations of a variety of wildlife species, and 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 fallen slightly compared to the time of the original sanitary survey, although there are still 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.

Southampton Water continues to be a popular and busy boating area, with an internationally important port and ferry terminal, as well as hundreds of moorings and berth spaces for recreational craft. Recreational vessels of a sufficient size to contain onboard toilets are considered to be the most likely to cause contamination of shellfish beds, particularly in the main navigational channels. The highest risk of this source of pollution will occur during summer months, although there are pump out facilities present at two of the marinas within the estuary. The overall risk of this source of pollution is not considered to have increased significantly.

Official control monitoring in this estuary indicates this is one of the more polluted BMPAs in England, with relatively high monitoring results across all RMPs. There is a general trend of RMPs farther up estuary recording higher levels of *E.coli* than RMPs located near the mouth. In instances where there are no specified point sources a general recommendation of placing RMPs at the up-estuary end of CZs should be followed. In instances where there are specific point sources identified, these should also be taken into consideration. However, at most of the RMPs currently sampled, trend lines fitted to the monitoring data suggests that shellfish hygiene levels are improving across the estuary, possibly due to upgrades to wastewater treatment network assets.

No significant differences in the monitoring results from RMPs currently sampled were observed, although results from *Tapes* spp. samples were higher than all other species. No statistically significant seasonal patterns were evident in the data, although at some RMPs results in winter were higher than at other times of year.

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

Having reviewed and compared the desk based study with the findings of the previous sanitary survey review in 2015, the FSA agree that changes to sources of contamination which have been accounted for in the desk-based assessment. This review has identified some knowledge gaps regarding the location of unclassified species and non-compliant spills from intermittent discharges. The FSA agree that a shoreline assessment will not capture this information and is not required, unless further information following secondary consultation suggests there may be an increase in the level of public health risk.

8 Recommendations

Recommendations for the various Classification Zones within the Southampton Water BMPA are described below and are summarised in Table 8.1. For several CZs, the availability of suitable stock for the placement of an RMP is unknown, and discussions between the LEA and the FSA are ongoing. In these situations, a description of the main contamination sources and a general recommendation is provided in place of specific RMP coordinates.

8.1 *Tapes* spp. clams

Eling

This covers an area of 3.79 km² and is positioned in the mouth of the River Test. The CZ has been designated as Prohibited since 2020, but is currently undergoing monitoring to explore the potential for reclassification. The current RMP for this zone is the Eling (B21AV) point at NGR SU 3905 1162. The main contamination sources to this zone are likely to be the continuous discharge from Millbrook STW and the continuous and intermittent discharge from Slowhill Copse WWTW. The current RMP is well placed to capture contamination from these sources and so should be retained moving forward. Should stock not be available at the current location, any future RMPs should be placed as close to these discharges as stock allows.

Hythe

This zone represents the north-western part of Southampton Water, and covers an area of 3.42 km². The 2015 sanitary survey review identified that the main sources of contamination to this zone were likely to be diffuse pollution from the River Test, as well as the point sources of the Millbrook and Slowhill Copse WwTWs, which are approximately 4 km upstream. The original sanitary survey recommended moving the RMP from the existing location to a point at Dibden Bay, nearer the upstream extent. This RMP was designed to replace the existing RMP at Hythe Knock. However, the current RMP used to classify this CZ is the one at Hythe Knock, and it is not clear why the RMP at Dibden Bay was never used; the LEA stated at secondary consultation that it was likely the proposed location was unsuitable. The exact distribution of *Tapes* spp. clams within this CZ is unknown, meaning that a precise set of coordinates for the RMP cannot be provided in this review. Discussions to determine a suitable RMP position are ongoing between the FSA and the LEA. This review has determined that the main sources of contamination are the sewage treatment works to the north, as well as diffuse pollution from the Test. As contamination levels are likely to occur on a gradient with highest levels at the northern (upstream) end of the CZ, the RMP

should be placed at the upstream boundary, as far offshore as necessary to obtain stock. The northern boundary of the CZ should be moved downstream to align with whichever RMP location is determined.

Weston Shelf

This CZ covers an area of 2.27 km² and is situated in the north-eastern part of Southampton Water. It extends as far downstream as the *Near Netley* CZ and meets the *Hythe* CZ at the mid-point of the estuary. The 2015 Review identified that the main contamination sources to this zone were the River Itchen and Woolston WwTW that is located at the northern end of the zone. The original sanitary survey recommended placing the RMP as close to the Woolston WwTW outfall as possible or moving the northern boundary of the CZ downstream to the location of stock. The zone is currently classified based on samples from the Weston Shelf B21AE RMP, but the RMP should be moved to the northern (upstream) extent of the stock within this CZ as the main sources of contamination have remained the same. The northern boundary of the CZ should be moved southwards to align with whichever position is finalised.

Bird Pile

This CZ sits between the *Hythe* and *Southampton Water – Off Fawley* CZs on the western side of the estuary. The 2015 sanitary review recommended retaining the existing RMP, Bird Pile B021W, as it was well placed to capture contamination from the Millbrook and Slowhill Copse WwTWs. It is recommended that this RMP be retained as these sources, as well as diffuse contamination from the River Test, continue to be the main polluting influences on this zone. The 2015 sanitary review provided the option to the LEA of combining the *Hythe* and *Bird Pile* CZs and using the *Hythe* RMP moving forward. During secondary consulation, the LEA confirmed that combining the two CZs was not required or desirable at this time..

Near Netley

This CZ sits between the *Weston Shelf* and *Hamble Estuary CZs* on the eastern side of the estuary. The original sanitary survey recommended moving the RMP from its historic position at Near Netley Castle to the upstream extent of the bed to better capture contamination from up-estuary sources. However, this recommendation has not been actioned to date, with the Near Netley Castle RMP continuing to be used. It is recommended that the RMP should be placed at the northern (upstream) extent of the CZ, as contamination is likely to occur on a gradient with the highest concentration at the upstream end. The upstream boundary of the CZ should be moved to align with whichever RMP location is decided following discussions between the FSA and the LEA.The 2015 sanitary review provided the option to the LEA of combining the *Near Netley* and *Weston Shelf* CZs and using the *Weston Shelf*'s RAMP moving forward. During secondary consulation, the LEA confirmed that combining the two CZs was not required or desirable at this time.

Southampton Water – Off Fawley

This CZ is the farthest downstream of the CZs on the western side of Southampton Water, and so as a consequence should receive a lower level of pollution than CZs farther upstream. A recommendation for *Tapes* spp. clams was not provided in the 2015 review, but it was for *M. mercenaria* clams and native oysters. The Ashlett Creek WwTW discharge is within the boundaries of this zone, and the 2015 review recommended moving the RMP to this discharge location for both classified species (*M. mercenaria* clams and native oysters). The current *Tapes* spp. RMP is Off Fawley, 300 m south of the recommended location. It is recommended that the RMP location recommended in the 2015 review for native oysters and *M. mercenaria* should be used as this will be more representative of the contamination sources affecting this zone.

Hamble Estuary

This CZ is the farthest downstream of the CZs on the eastern side of Southampton Water, and so as a consequence should receive a lower level of pollution than CZs farther upstream. It will also receive some diffuse contamination from the River Hamble. A recommendation for *Tapes* spp. clams for this area was not provided in the 2015 review, but it was for *M. mercenaria* clams and native oysters. The current RMP (now using using *Tapes* spp clams in the same location as *M. mercenaria* and native oysters were used) continues to be representative of the worst case contamination, and should be retained.

8.2 American Hard Clams

There are currently three Classification Zones for this species, *Bird Pile*, *Hamble Estuary* and *Southampton Water – Off Fawley*, all of which are currently classified based on *Tapes* spp. samples. It is considered that *Tapes* spp. accumulate *E. coli* to a similar or greater extent than *M. mercenaria* and so can continue to be used as indicator species (Cefas, 2014). However, it may be the case that the Classification Status of the *M. mercenaria* CZs

improves if samples were taken from *M. mercenaria*. Should the use of an indicator species cease, the RMPs should be placed in the same locations and samples taken to the same criteria.

During consultations, S-IFCA confirmed the locations of commercial harvesting of *M. mercenaria* within CZs. These have been included in the proposed sampling plan. As it is considered that Tapes spp. clams would be a suitable indicator species for *M. mercenaria* classification zones (Cefas, 2014), in any location that classification for *M. mercenaria* is required, the Tapes spp. RMP can be used.

8.3 Native oyster

There are currently two Classification Zones for this species, *Hamble Estuary* and *Southampton Water – Off Fawley*. Both zones cover the same areas as the *Tapes* spp. and *M. mercenaria* CZs of the same name. The recommendations for these zones are the same as for the zones discussed above. *Tapes* spp. accumulate to a similar or greater extent than native oysters (Cefas, 2014), and so can be used as an indicator species. Following discussions with the LEA at secondary consultation, *Tapes* spp. should be used as indicator species for all native oyster CZs.

During consultations, S-IFCA confirmed the locations of commercial harvesting of native oysters within CZs. These have been included in the proposed sampling plan. As it is considered that Tapes spp. clams would be a suitable indicator species for native oyster classification zones (Cefas, 2014), in any location that classification for native oyster is required, the Tapes spp. RMP can be used.

8.4 Pacific oyster

There is currently only one Classification Zone for this species, *Southampton Water – Off Fawley*, which is classified based on samples from a native oyster RMP. Native oysters are considered to be suitable indicator species for Pacific oyster (Cefas, 2014), and so the practice can continue. Additionally, *Tapes* spp. accumulate to a similar or greater extent than Pacific oysters (Cefas, 2014), and so can be used as an indicator species. Following discussions with the LEA at secondary consultation, *Tapes* spp. should be used as indicator species for all Pacific oyster CZs.

During consultations, S-IFCA confirmed the locations of commercial harvesting of Pacific oysters within CZs. These have been included in the proposed sampling plan. As it is considered that Tapes spp. clams would be a suitable indicator species for Pacific oyster classification zones (Cefas, 2014), in any location that classification for Pacific oyster is required, the Tapes spp. RMP can be used.

8.5 Cockles

There are currently no active classification zones for cockles within the Southampton Water BMPA. However, we understand from initial consultations with S-IFCA that this species is frequently caught throughout the clam fishery. It is considered that *Tapes* spp. clams would

be a suitable indicator species for cockle classification zones (Cefas, 2014), and so in any location that classification for cockles is required, the *Tapes* spp. RMP can be used.

8.6 General Information

8.6.1 Location Reference

Production Area	**Southampton Water**
Cefas Main Site Reference	M021
Ordnance survey 1:25,000	OL22 (New Forest), 119 (Meon Valley)
Admiralty Chart	No. 2036 & 2041

8.6.2 Shellfishery

Species	Culture Method	Seasonality of Harvest
***Tapes* spp.**	Wild	Close Season: 1st March – 31st October inclusive
M. mercenaria	Wild	Close Season: 1st March – 31st October inclusive
Ostrea edulis	Wild	Close Season: 1st March – 31st October inclusive
Crassostrea gigas	Wild	Close Season: 1st March – 31st October inclusive
Cerastoderma edule*	Wild	Close Season: 1st March – 31st October inclusive

**Not currently classified for commercial harvest*

8.6.3 Local Enforcement Authority(s)

Name	**Southampton Port Health Authority** **City Depot,** **First Avenue,** **Southampton** SO15 0LJ
Website	https://www.southampton.gov.uk/business-licensing/port-health/
Telephone number	02380 226631
E-mail address	porthealth@southampton.gov.uk

*Table 8.1 Proposed sampling plan for the Southampton Water 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
Eling (*Tapes* spp.; Cockles, *M. mercenaria*)	B21AV	Eling	SU 3905 1162	50° 54'.164 N 1°26'.76 W	*Tapes* spp.; Cockles, *M. mercenaria*	Dredge	Dredge	*Tapes* spp.	250 m	Monthly
Hythe (*Tapes* spp; Cockles, *M. mercenaria*)	**TBC**	**TBC**	**TBC**	**TBC**	*Tapes spp*; Cockles, *M. mercenaria*	Dredge	Dredge	*Tapes* spp.	250 m	Monthly
Weston Shelf (*Tapes* spp.; Cockles, *M. mercenaria*, *native oyster; Pacific oyster*)	**TBC**	**TBC**	**TBC**	**TBC**	*Tapes spp*; Cockles, *M. mercenaria*, *native oyster; Pacific oyster*	Dredge	Dredge	*Tapes* spp.	250 m	Monthly
Bird Pile (*Tapes* spp.; Cockles; *M. mercenaria*)	B021 W	Bird Pile	SU 44249 07130	50°51.720' N 01°22.359' W	*Tapes spp*; Cockles; *M. mercenaria*	Dredge	Dredge	*Tapes* spp.	250 m	Monthly

Classification Zone	RMP	RMP Name	NGR (OSGB 1936)	Lat / Lon (WGS 1984)	Species Represented	Harvesting Technique	Sampling Method	Sampling Species	Tolerance	Frequency
Near Netley (*Tapes* spp.; Cockles, *M. mercenaria*, *native oyster; Pacific oyster*)	**TBC**	**TBC**	**TBC**	**TBC**	*Tapes spp*; Cockles; *M. mercenaria*, *native oyster; Pacific oyster*	Dredge	Dredge	*Tapes* spp.	250 m	Monthly
Southampton Water – Off Fawley (*Tapes* spp.; Cockles; *M. mercenaria*, *native oyster, Pacific oyster*)	**TBC**	**Off Ashlett Creek WwTW**	**SU 48070 03509**	**50°49.748' N 01°19.130' W**	*Tapes spp*; Cockles; *M. mercenaria; native oyster; Pacific oyster*	Dredge	Dredge	*Tapes* spp.	100 m	Monthly
Hamble Estuary (*Tapes* spp.; Cockles; *M. mercenaria*, *native oyster, Pacific oyster*)	B21AT	Hamble Estuary	SU 48759 05299	50° 50'.710'N 1° 18'.529'W	*Tapes spp*; Cockles; *M. mercenaria; **native oyster; Pacific oyster***	Dredge	Dredge	*Tapes* spp.	250 m	Monthly

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10 Appendices

Appendix I. 2021 Event Duration Monitoring Summary for discharges in the Southampton Water catchment

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
PORTSWOOD WWTW	Storm tank at WwTW	SU4362014840	RIVER ITCHEN ESTUARY	42	291.71	0
VICTORIA ROAD NETLEY CEO	Storm discharge at pumping station	SU4564008080	SOUTHAMPTON WATER	0	0.00	0
SOUTHCLIFF ROAD/LIVERPOOL STREET	SO on sewer network	SU4307013070	ITCHEN ESTUARY	3	0.63	0
BLECHYNDEN TERRACE SOUTHAMPTON CSO	SO on sewer network	SU4150011090	RIVER TEST	12	12.69	0
HIGH STREET/BRITON STREET CSO	SO on sewer network	SU4207010840	RIVER TEST ESTUARY	1	0.69	0
IMPERIAL ROAD MOUNT PLEASANT CEO	Storm discharge at pumping station	SU4297013070	RIVER ITCHEN	12	11.36	0
CAWTE ROAD/PARK ROAD CSO	SO on sewer network	SU3935012200	TEST ESTUARY	21	13.41	0
MILLBROOK WWTW	Storm tank at WwTW	SU3871011760	THE RIVER TEST	53	574.38	0

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
RAMPART ROAD PS	Storm discharge at pumping station	SU4374013070	RIVER ITCHEN ESTUARY	2	6.43	0
SIRDAR ROAD SOUTHAMPTON CSO	SO on sewer network	SU4359014960	RIVER ITCHEN	22	31.50	0
BEACH LANE NETLEY CEO	Storm discharge at pumping station	SU4506008350	SOUTHAMPTON WATER	2	3.13	0
MILLBROOK WWTW	Inlet SO at WwTW	SU3871011760	THE RIVER TEST	0	0.00	0
ASHLETT CREEK WWTW	Storm tank at WwTW	SU4807003510	SOUTHAMPTON WATER	15	118.37	0
ENSIGN PARK HAMBLE CEO	Storm discharge at pumping station	SU4717006490	SOUTHAMPTON WATER	13	20.05	0
CHAPEL WHARF WPS	Storm discharge at pumping station	SU4315011470	RIVER ITCHEN ESTUARY	1	8.27	0
UPR SHAFTESBURY AVE SOUTHAMPTON CSO	SO on sewer network	SU4357014560	RIVER ITCHEN	4	1.40	0.01

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
CEDAR ROAD SOUTHAMPTON CSO	SO on sewer network	SU4309013520	RIVER ITCHEN	0	0.00	0.02
LAWN ROAD/OSBOURNE ROAD	SO on sewer network	SU4309013520	ITCHEN ESTUARY	6	2.33	0.02
ALEXANDRA ROAD HYTHE CSO	SO on sewer network	SU4250008010	SOUTHAMPTON WATER	7	3.01	0.03
SLOWHILL COPSE WWTW	Storm tank at WwTW	SU3862011350	SOUTHAMPTON WATER	37	367.11	0.05
HOOK PARK WPS	Storm discharge at pumping station	SU5040003420	SOUTHAMPTON WATER	13	135.38	0.09
HOOK PARK WPS	Storm discharge at pumping station	SU5040003420	SOUTHAMPTON WATER	31	228.95	0.09
TATES COPSE PS	Storm discharge at pumping station	SU4327007120	SOUTHAMPTON WATER	1	3.75	0.16
WOOLSTON WWTW	Inlet SO at WwTW	SU4339010440	RIVER ITCHEN ESTUARY	0	0.00	0.21
WOOLSTON WWTW	Storm tank at WwTW	SU4339010440	RIVER ITCHEN ESTUARY	23	127.98	0.21

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
SCHOOL LANE HAMBLE CEO	Storm discharge at pumping station	SU4830006240	RIVER HAMBLE	11	27.87	0.37
GLENFIELD AVENUE CSO	SO on sewer network	SU4434013350	RIVER MIDDEN	0	0.00	0.42
NEWTOWN ROAD NEWTOWN CEO	Storm discharge at pumping station	SU4939005070	HOOK LAKE	14	59.54	0.44
WESSEX LANE SOUTHAMPTON OUTSIDE 11	SO on sewer network	SU4401015990	SALINE ESTUARY	0	0.00	0.68
WESSEX LANE SOUTHAMPTON OUTSIDE 15	SO on sewer network	SU4401015990	SALINE ESTUARY	0	0.00	0.68
WESSEX LANE SOUTHAMPTON	SO on sewer network	SU4403016020	SALINE ESTUARY	0	0.00	0.72
DIBLES ROAD WARSASH PS	Storm discharge at pumping station	SU4999006110	HOOK LAKE	3	19.03	1.04
INGLESIDE NETLEY PUMPING STATION	Storm discharge at pumping station	SU4647008890	TRIBUTARY TO SPEAR POND GULLY	0	0.00	1.15
GATERS MILL	SO on sewer network	SU4535015580	RIVER ITCHEN	5	4.51	1.41

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
BRUNEL ROAD WPS	Storm discharge at pumping station	SU3703013670	RIVER TEST ESTUARY	0	0.00	1.67
DOWNS PARK TOTTON CEO	Storm discharge at pumping station	SU3593012550	BARTLEY WATER (TIDAL)	4	9.01	1.91
SALTERNS LANE BURSLEDON CEO	Storm discharge at pumping station	SU4819008660	BADM CREEK	32	130.87	2.16
HAMBLE LANE BURSLEDON WASTEWATER PS	Storm discharge at pumping station	SU4815008730	RIVER HAMBLE ESTUARY	38	464.17	2.18
HUNGERFORD BOTTOM BURSLEDON CEO	Storm discharge at pumping station	SU4791009170	HUNGERFORD STREAM	13	36.35	2.34
POUND ROAD BURSLEDON CEO	Storm discharge at pumping station	SU4724010000	UNMED TRIB OF RIVER ITCHEN	0	0.00	2.41
CHESTNUT AVENUE CEO	Storm discharge at pumping station	SU4427018170	THE MONKS BROOK	4	9.13	2.88
ASHURST BRIDGE CEO	Storm discharge at pumping station	SU3451012490	BARTLEY WATER	4	12.96	3.27

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
GREEN LANE CHILWORTH CEO	Storm discharge at pumping station	SU4204018020	UNMED TRIB OF RIVER ITCHEN	5	2.96	3.27
ASHDENE ROAD ASHURST CSO	SO on sewer network	SU3399011410	BARTLEY WATER	35	211.05	3.77
CHICKENHALL EASTLEIGH WWTW	Storm tank at WwTW	SU4681017880	THE RIVER ITCHEN	20	127.95	3.85
TEMPLARS WAY CHANDLERS FORD CEO	Storm discharge at pumping station	SU4278019160	MONKS BROOK VIA DRAIN	1	9.67	4.02
CHALICE COURT HEDGE END CEO	Storm discharge at pumping station	SU4862012890	WILDERN STREAM	0	0.00	4.35
MARLBOROUGH GARDENS HEDGE END CEO	Storm discharge at pumping station	SU4928015270	MOORGREEN STREAM	0	0.00	5.3
WELLS CLOSE WHITELEY CEO	Storm discharge at pumping station	SU5223010050	BURRIDGE STREAM	0	0.00	5.46
BURNETTS LANE WPS	Storm discharge at pumping station	SU4927017020	TRIBUTARY OF RIVER ITCHEN	17	116.23	5.58

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
PARK ROAD CHANDLERS FORD CSO	SO on sewer network	SU4342020980	MONKS BROOK	0	0.00	5.69
WHITELEY WPS	Storm discharge at pumping station	SU5347009630	CURBRIDGE STREAM	0	0.00	5.97
VALLEY ROAD CHANDLERS FORD CSO	SO on sewer network	SU4313021320	TRIBUTARY OF THE MONKS BROOK	8	0.54	6.06
BROAD OAK BOTLEY CSO	SO on sewer network	SU5046013150	TRIBUTARY OF RIVER HAMBLE	15	37.03	6.21
BROOK LANE PS	Storm discharge at pumping station	SU5152011340	RIVER HAMBLE (TIDAL)	2	3.88	6.23
RINGWOOD DRIVE NORTH BADDESLEY CEO	Storm discharge at pumping station	SU3839019890	UNMED TRIB. OF RIVER TEST	8	15.67	7.08
BOTLEY ROAD WPS (NORTH BADDESLEY)	Storm discharge at pumping station	SU3885020460	TRIBUTARY OF THE TADBURN LAKE	0	0.00	7.15
CHURCH LANE BOTLEY CEO	Storm discharge at pumping station	SU5144012650	RIVER HAMBLE	6	52.81	7.17
HAMBLEWOOD BOTLEY CSO	SO on sewer network	SU5151012970	RIVER HAMBLE	3	28.87	7.25

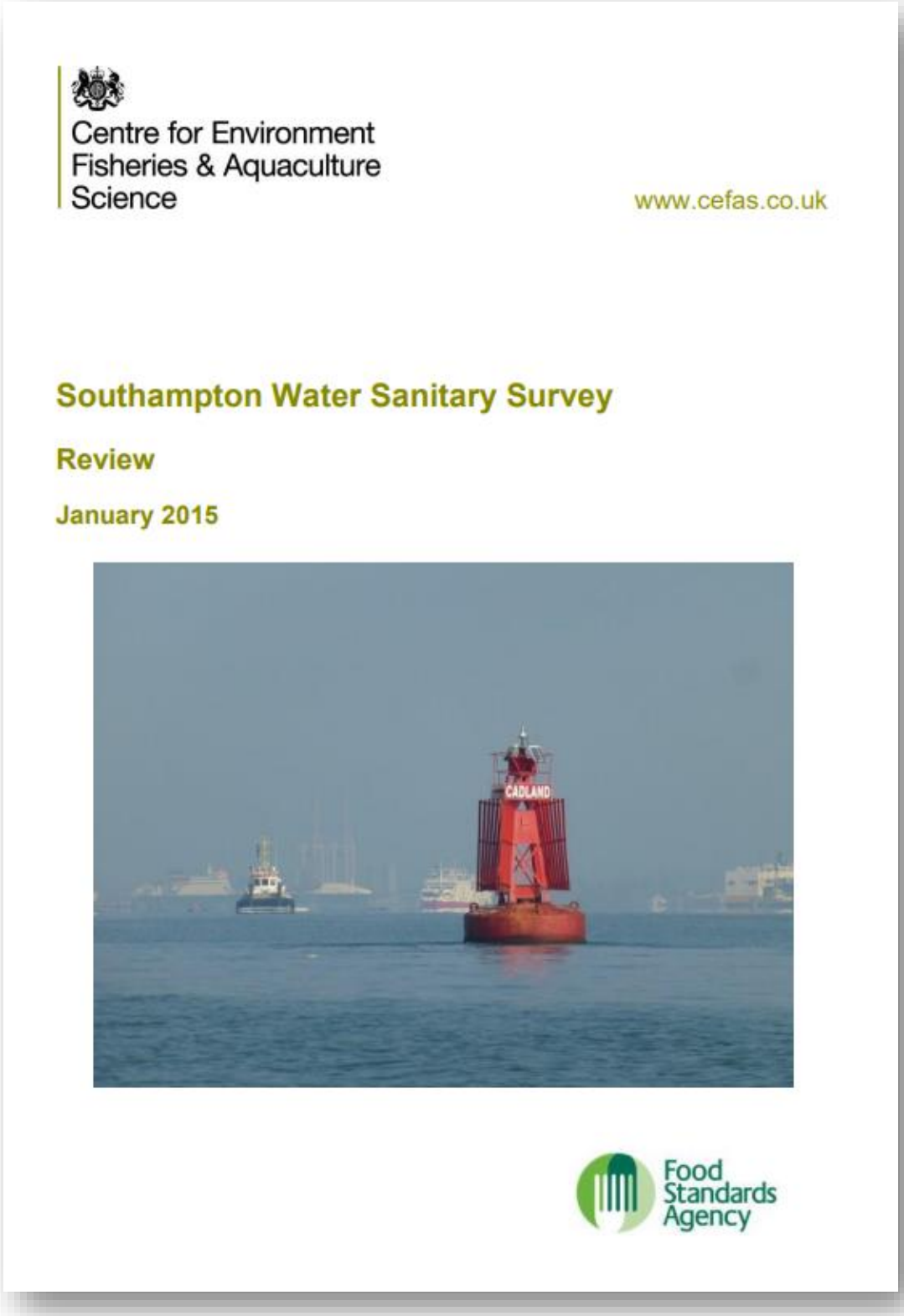
Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
FAIRTHORNE MANOR CEO	Storm discharge at pumping station	SU5234012280	SHAWFORDS LAKE	2	7.97	7.44
HEATHEN LANE DURLEY CEO	Storm discharge at pumping station	SU5152015880	FORD LAKE VIA STREAM	104	1708.61	7.57
POLLARDS MOOR CADM CEO	Storm discharge at pumping station	SU3031014370	POLLARDS MOOR STREAM	0	0.00	7.82
DURLEY LANE DURLEY CEO	Storm discharge at pumping station	SU5209017260	UNMED TRIB OF RIVER HAMBLE	27	210.78	8.36
ROMSEY WWTW	Storm tank at WwTW	SU3495020620	THE RIVER TEST	9	70.62	8.86
CONSORT ROAD EASTLEIGH CSO	SO on sewer network	SU4592024060	RIVER ITCHEN	0	0.00	8.97
MEMORIAL PARK ROMSEY CEO	Storm discharge at pumping station	SU3488020780	RIVER TEST	0	0.00	9.04
THE HUNDRED ROMSEY CSO	SO on sewer network	SU3551020990	TADBURN LAKE	2	10.00	9.05
EIGHT ACRES ROMSEY CSO	SO on sewer network	SU3651021360	TADBURN LAKE	0	0.00	9.19
WEST WELLOW WWTW	Storm tank at WwTW	SU3172019160	RIVER BLACKWATER	130	2395.64	9.28

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
WELLOW MILL WPS	Storm discharge at pumping station	SU3116019560	RIVER BLACKWATER	25	192.25	9.96
BISHOPS WALTHAM WWTW	Storm tank at WwTW	SU5414015990	THE RIVER HAMBLE	0	0.00	10.19
ASHTON CORNER CEO	Storm discharge at pumping station	SU5397018190	TRIBUTARY OF THE RIVER HAMBLE	8	17.72	10.41
GARNIER ROAD	Storm discharge at pumping station	SU4802028200	FRESHWATER RIVER	1	1.34	13.52
MORESTEAD WWTW	Storm tank at WwTW	SU4958027990	GROUNDWATERS VIA 2 INFILT SYST	2	4.53	13.88
KINGS SOMBORNE WWTW	Storm tank at WwTW	SU3373028750	TRIBUTARY OF THE RIVER TEST	90	1840.31	16.83
KINGS SOMBORNE WWTW	Inlet SO at WwTW	SU3373028750	TRIBUTARY OF THE RIVER TEST	0	0.00	16.83
HARESTOCK WASTEWATER TREATMENT WORK	Storm tank at WwTW	SU4928031420	THE RIVER ITCHEN	0	0.00	16.97
WHITEPARISH WWTW	Storm tank at WwTW	SU2411022540	TRIB OF RIVER BLACKWATER	0	0.00	17.23

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
REDLYNCH WWTW	Storm tank at WwTW	SU2189020030	RIVER BLACKWATER	72	1157.38	17.8
STOCKBRIDGE WWTW	Storm tank at WwTW	SU3534034440	THE MARSHCOURT RIVER	112	1690.48	20.97
TRAFALGAR WAY STOCKBRIDGE CEO	Storm discharge at pumping station	SU3584034940	RIVER TEST	3	3.10	21.23
EAST GRIMSTEAD WWTW	Storm tank at WwTW	SU2303027650	GROUNDWATER/RIVER DUN	27	192.19	21.42
NEW ALRESFORD WWTW	Storm tank at WwTW	SU5894030630	GROUNDWATER	1	0.33	21.43
SPRING GARDENS PS	Storm discharge at pumping station	SU5788031620	DITCH TRIB OF RIVER ITCHEN	0	0.00	21.45
HOUGHTON ROAD STOCKBRIDGE CEO	Storm discharge at pumping station	SU3520034970	RIVER TEST	0	0.00	21.51
FULLERTON WASTEWATER TREATMENT WORK	Storm tank at WwTW	SU3816039170	THE RIVER TEST	0	0.00	24.55
CHILBOLTON WWTW	Storm tank at WwTW	SU3865039460	THE RIVER TEST	0	0.00	24.72

Asset Name	Asset Type	NGR	Receiving Water	No. Spills in 2021	Duration of spills (hrs) in 2021	Distance to nearest CZ (km)
ANTON LANE CEO	Storm discharge at pumping station	SU3609044990	RIVER ANTON	0	0.00	30.7
OVERTON WASTEWATER TREATMENT WORKS	Storm tank at WwTW	SU5049050020	GROUNDWATERS VIA SOAKAWAY SYS	10	26.65	35.32

Appendix II. Southampton Water Sanitary Survey Report 2023



Follow hyperlink in image to view full report.

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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.

Our clients operate in a range of industry sectors including civil engineering and construction, ports and harbours, new and existing nuclear power, renewable energy (including offshore wind, tidal energy and wave energy), public sector, government, NGOs, transport and water.

Our aim is to offer professional, high quality and robust solutions to our clients, using the latest techniques, innovation and recognised best practice.

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Carcinus provides environmental consultancy services for both freshwater and marine environments. Our freshwater and marine environmental consultants provide services that include scoping studies, Environmental Impact Assessment (EIA) for ecological and human receptors, Habitats Regulations Appraisal (HRA), Water Framework Directive (WFD) assessments, project management, licensing and consent support, pre-dredge sediment assessments and options appraisal, stakeholder and regulator engagement, survey design and management and site selection and feasibility studies.

Ecological and Geophysical Surveys

Carcinus delivers ecology surveys in both marine and freshwater environments. Our staff are experienced in the design and implementation of ecological surveys, including marine subtidal and intertidal fish ecology and benthic ecology, freshwater fisheries, macro invertebrate sampling, macrophytes, marine mammals, birds, habitat mapping, River Habitat Surveys (RHS), phase 1 habitat surveys, catchment studies, water quality and sediment sampling and analysis, ichthyoplankton, zooplankton and phytoplankton.

In addition, we provide aerial, topographic, bathymetric and laser scan surveys for nearshore, coastal and riverine environments.

Our Vision

"*To be a dependable partner to our clients, providing robust and reliable environmental advice, services and support, enabling them to achieve project aims whilst taking due care of the sensitivity of the environment*"