Sanitary Survey- Review

Porthallow Cove – 2023

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Initial Consultation

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A sanitary survey relevant to the bivalve mollusc beds in Porthallow Cove 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 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, Cornwall Port Health Authority. The report is publicly available via the Carcinus Ltd. website.

Recommended Bibliographic Citation:

Carcinus Ltd., 2022. Review of the Porthallow Cove 2009 Sanitary Survey. Carcinus report on behalf of the Food Standards Agency, to demonstrate compliance with the requirements for classification of bivalve mollusc production areas in England and Wales under retained EU Law Regulation (EU) 2019/627.

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1 Introduction

1.1 Background

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

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

1.2 Porthallow Cove Review

This report reviews information and makes recommendations for a revised sampling plan for the existing mussel (*Mytilus spp.*) classification zone in Porthallow Cove (Figure 1.1). This review explores any changes to the main microbiological contamination sources that have taken place since the original sanitary survey was conducted and their impact on the classified shellfishery. Data for this review was gathered through a desk-based study and consultation with stakeholders.

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

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

The review updates the assessment originally conducted in 2009 and sampling plan as necessary and the report should read in conjunction with the previous survey.

Specifically, this review considers:
(a) Changes to the shellfishery (if any);
(b) Changes in microbiological monitoring results;

(c) Changes in sources of pollution impacting the production area or new evidence relating to the actual or potential impact of sources;

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

(e) Change in environmental conditions;

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

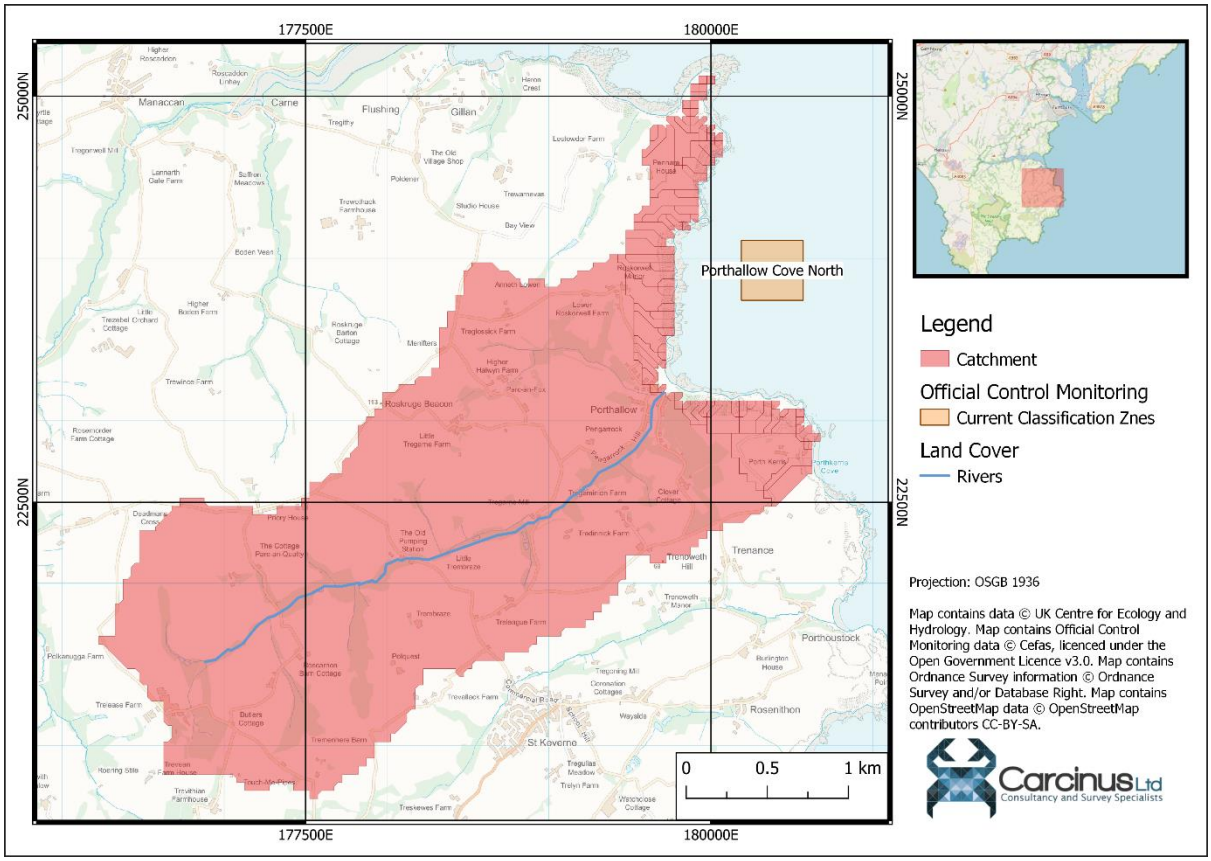

Figure 1.1 Location of the Porthallow Cove bivalve mollusc production area (BMPA) on the east coast of the Lizard Peninsula.

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 July 2023;
- Only information that may impact on the microbial contamination was considered for this review; and

- Official Control monitoring data have been provided through a request to Cefas, with no additional verification of the data undertaken. The data are also available directly from the Cefas data hub[1]. Results up to and including June 2023 have been used within this study. Any subsequent samples have not been included.

2 Shellfisheries

2.1 Description of Shellfishery

The Porthallow Cove BMPA is contained within Porthallow Cove, a small embayment situated on the eastern side of the Lizard Peninsula, Cornwall. The Helford and Fal BMPAs are 3 km and 11 km to the north, respectively.

The Local Enforcement Authority (LEA) responsible for this fishery in terms of food hygiene Official Control purposes (including sampling) is the Cornwall Port Health Authority. During initial consultations, Cornwall Inshore Fisheries and Conservation Authority (C-IFCA) stated that the shellfishery within Porthallow Cove is a public fishery, but that some level of ownership rights is conferred from the fact that the shellfish production is carried out on rope infrastructure subject to a Crown Estate seabed licence. There are no byelaws applicable to the harvest of mussels within this BMPA.

Prior to the publication of the 2009 Sanitary Survey, there was no active fishery within Porthallow Cove. The only active shellfishery is that of rope grown mussels. A summary of the mussel fishery is summarised in the section below.

2.1.1 Mussels

The 2009 Sanitary Survey gave recommendations for the creation of two Classification Zones for this species, a larger 1.0 km² zone in the north (*Porthallow North*) and a 0.4 km² zone in the south (*Porthallow South*), separated by a 300 m navigable channel. The *Porthallow South* zone was declassified in 2010 due to a lack of commercial interest in that zone. The current output from the *Porthallow North* CZ is 50 – 80 tonnes per annum.

2.1.2 Other Species

During initial consultations, the authors of this review were advised that there are significant natural populations of razor clams within the cove, with suitable substrates found along the south coast. No stock assessment work has been undertaken, and there are no plans to pursue classification of this species.

2.2 Classification History

The 2009 Sanitary Survey recommended the creation of two Classification Zones within the Porthallow Cove BMPA. Both CZs were declassified in 2010 following a lack of commercial interest. The *Porthallow North* CZ was reclassified for production in 2018 following a pRMP assessment (Carcinus, 2017). 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 2.1.

[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/.

Table 2.1 Summary of all currently active classification zones in the Porthallow Cove BMPA.

Classification Zone	Species	Current Classification (as of June 2023)
Porthallow North	Mussels	A

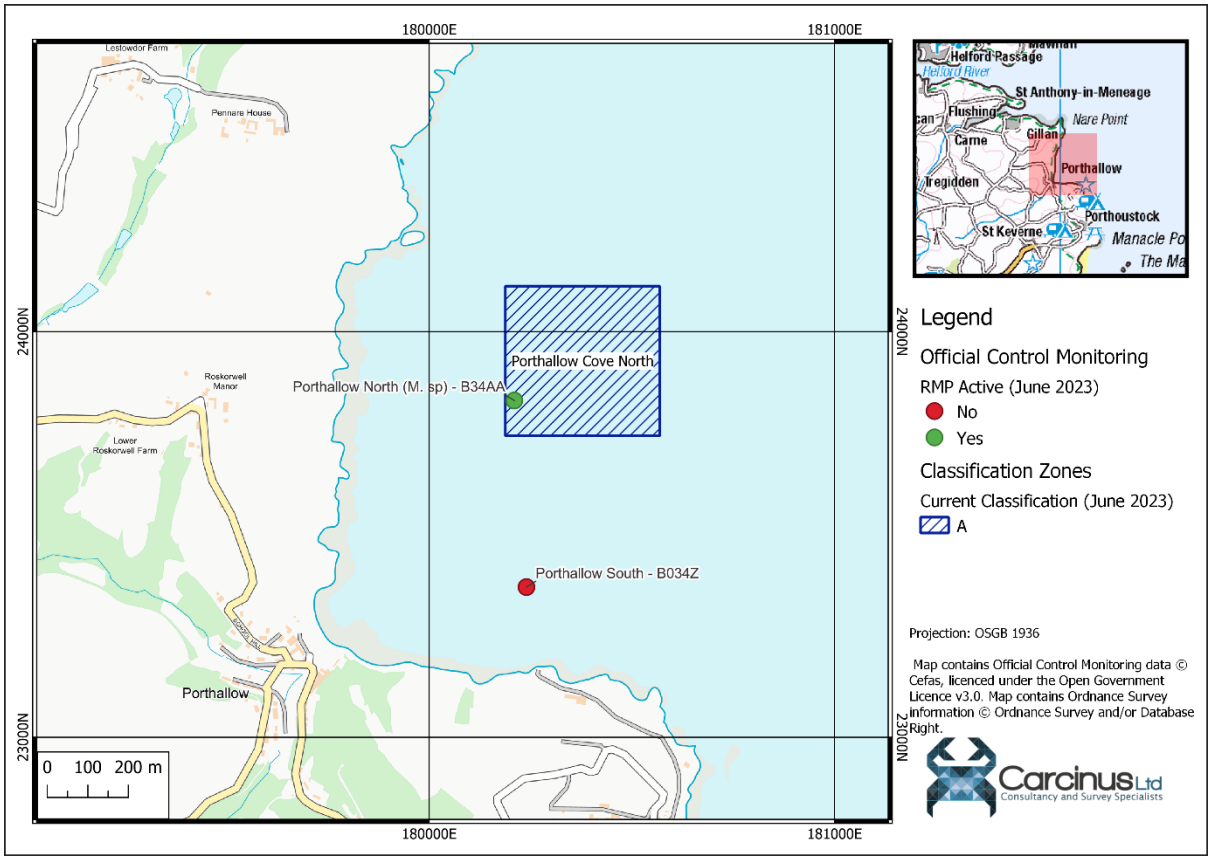

Figure 2.1 Current Classification Zones and associated Representative Monitoring Points in the Porthallow BMPA.

3 Pollution sources

3.1 Human Population

Direct comparison with the population statistics presented in the 2009 Sanitary Survey is not possible as the raw data are not available. To give an estimate of the changes in the human population across the catchment (defined in Figure 1.1) since the previous survey was published, the results of the 2011 and 2021 Censuses have been compared. The smallest geographical area for which census statistics are computed are Output Areas, which are made up of a resident population of between 100 and 625 persons (Office for National Statistics, 2023). There are only five of these Output Areas within the catchment, and 90% of the land area is taken up by two of these.

Population in both of these Output Areas fell between 2011 and 2021, but the total estimated population of the catchment increased from 1,450 people in 2011 to 1,469 in 2021 (an increase of 1.3%). Mean population density of the catchment is fewer than 60

people per square kilometre, and the two largest Output Areas have population densities of less than 50 people per kilometre. There are no significant urban conurbations within the catchment, the only settlements are the village of Porthallow, adjacent to the shoreline, and the hamlets of Roskorwell, Tregarne and Tregorwis. During initial consultations, the Environment Agency confirmed that there have been no recent housing developments in the Porthallow area, and that none have been proposed. There may be some small risk of urban runoff from the village of Porthallow, but the overall impact on the bacteriological contamination of the shellfishery is considered to be low, in comparison to other sources of contamination discussed later in this report, mainly due to the low population size and lack of large urban areas within the catchment.

No recent tourism statistics were available to the authors of this review, although it is highly likely that there continues to be a significant seasonal increase in population numbers during the summer months. There may be some increased loading to the wastewater treatment network expected in summer months, but no information has been received to suggest that the existing wastewater treatment network is insufficient to handle this increase. Full details of the changes to the wastewater treatment network are discussed in the next section.

Analysis of changes to Census data for the catchment suggests that the area continues to be very rural, with generally low risks of contamination from urban sources. Contamination levels are likely to be highest from the village of Porthallow, as it is located adjacent to the shoreline, and contamination from this source is likely to be highest in summer months with the seasonal influx of tourists. Overall, the recommendations made in the 2009 Sanitary Survey to account for the impact of human populations remains valid.

3.2 Sewage

Details of all consented discharges in the vicinity of the Porthallow BMPA were taken from the most recent update to the Environment Agency's national permit database at the time of writing (July 2023). The locations of these discharges within the catchment and near the Classification Zones are shown in Figure 3.1.

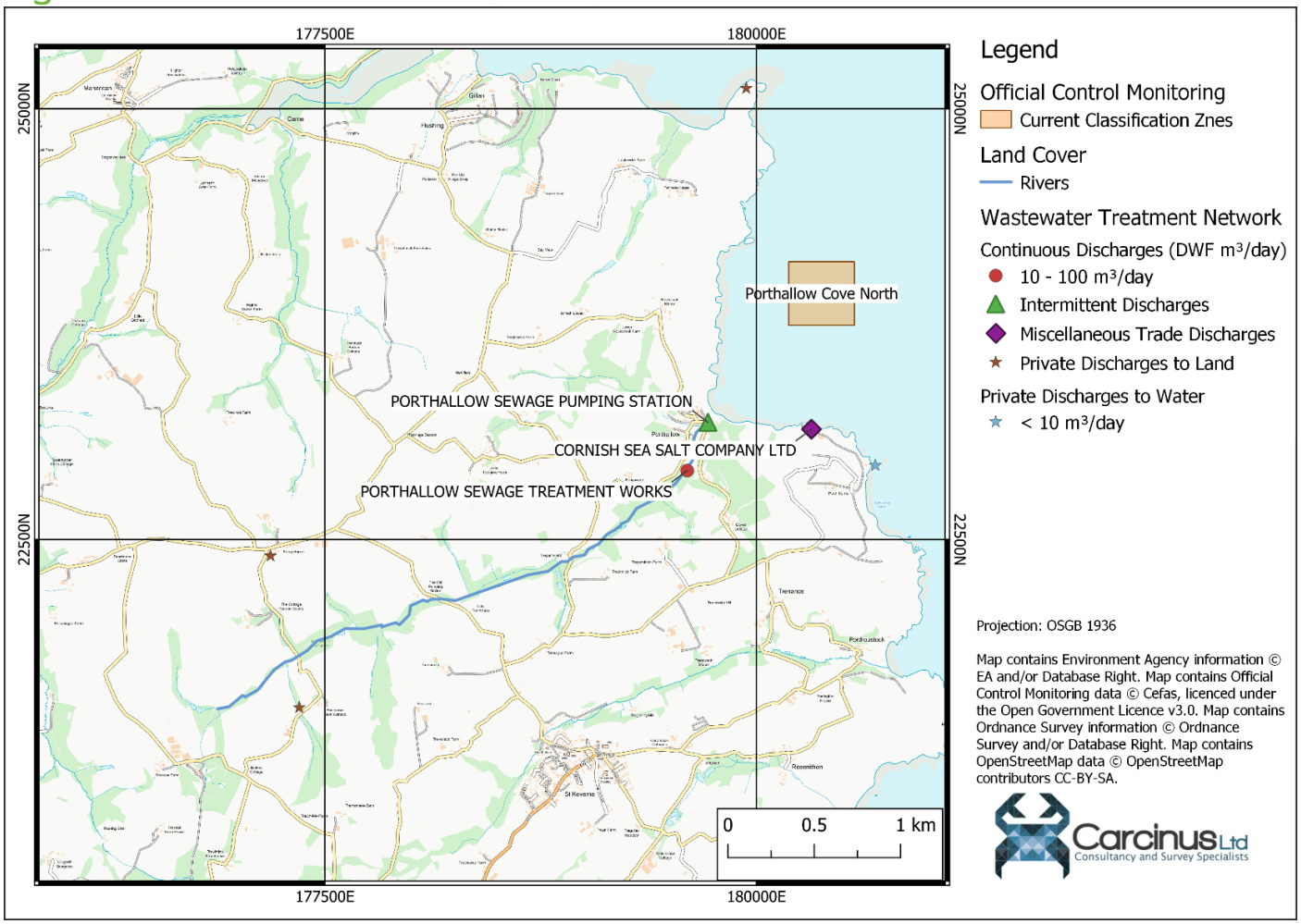

Figure 3.1 Locations of all consented discharges in the vicinity of the Porthallow Cove BMPA. Details of continuous discharges are provided in Table 3.1.

Table 3.1 Details of all continuous discharges in the vicinity of the Porthallow Shellfish Water.

Discharge Name	Permit Number	Receiving Water	NGR	Treatment	Dry Weather Flow (m^3/day)	Distance from CZ (km)
PORTHALLOW SEWAGE TREATMENT WORKS	300968	PORTHALLOW STREAM (S)	SW 79600 22900	UV DISINFECTION	36	1.0

Figure 3.1 illustrates that the water company owned sewerage infrastructure in the vicinity of the Porthallow BMPA is relatively sparce, reflecting the small population of the area. There is only one continuous water company owned discharge, Porthallow Sewage Treatment Works (STW), which has a consented discharge volume of only 36 m^3/day and employs UV disinfection. The 2017 pRMP assessment (Carcinus, 2017) also identified the St Keverne and Helford STWs as being within 2 km of the shellfishery. Both of these discharges are still active, although given they have a very small consented discharge volume (250 and 50 m^3/day respectively), and the complex pattern of tidal cycles that would be required for effluent from these discharges to affect the BMPA, they do not require additional consideration within this review. The 2021 Shellfish Water Action Plan for the Porthallow Shellfish Water states that there are around 60 homes connected to this STW, including a number of homes that used to discharge directly to the Porthallow Stream. During secondary consultation, the EA indicated that this change occurred during Asset Monitoring Period (AMP) 3 (2000 – 2005). This discharge is considered to have a very small impact on the overall bacteriological health of the BMPA due to the small consented discharge volume and tertiary treatment methodology. Porthallow was only designated as a Shellfish Water in 2022, and as such there are no planned upgrades or improvements for this asset during Asset Monitoring Period (AMP) 7 (2020 – 2025). The EA confirmed that there would likely be a comprehensive investigation to assess the relative contribution of microbial sources to overall contamination levels within this Shellfish Water in AMP8 (2025 – 2030).

In addition to the water company owned discharges, the 2009 Sanitary Survey identified a single intermittent discharge in the area. 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 intermittent discharges throughout the country. Summary data for 2020, 2021 and 2022 was published by the Environment Agency in March 2021, March 2022 and March 2023 respectively (Environment Agency, 2023) and the data for the main intermittent discharge in the area is provided in Table 3.2

Table 3.2 Event Duration Monitoring Summary for the Porthallow Sewage Pumping Station.

Year	No. Spills (12-24 hr counting method)	Total duration of spills (hours)
2020	2	4.11
2021	0	0
2022	0	0

When intermittent discharges are actively discharging, the contamination caused is often high as generally the discharge is either not treated at all or is only screened (which is the case for the Porthallow Sewage Pumping Station). However, as this discharge has only spilled for 4 hrs since 2020, the overall impact on bacteriological water quality is considered

to be low. No comparison with the situation at the time of the 2009 Sanitary Survey is possible as the EDM capability was fitted to the discharge in 2015.

The Environment Agency confirmed during initial consultation that there had been no recorded failures or incidents at Water Company owned assets since 2013.

In addition to the water company owned infrastructure, there continue to be a few small private discharges in the vicinity of the Porthallow BMPA. Limited details of these discharges can be provided due to data protection requirements, but the assessment of the impact from these discharges is considered to be small compared to other sources of contamination discussed elsewhere in this report, as the volume of effluent (and therefore concentration of *E. coli* discharged) will be small.

Overall, the wastewater treatment network of the Porthallow area continues to be relatively sparse, reflecting the small population size. The overall impact of this source of contamination continues to be small. No updates to the sampling plan are necessary as part of this review since the recommendations made in the 2009 sanitary survey to account for the impact of this source of pollution remain valid.

3.3 Agricultural Sources

The 2009 Sanitary Survey cites livestock population data for the Porthallow area based on the 2007 Livestock Census. To provide an indication of changes in the livestock population of the catchment, a data request was made to the Farming Statistics Office for the Department for Environment, Food and Rural Affairs (DEFRA) for livestock populations within the catchment presented in Figure 1.1 for 2010 and 2021 based on the June Survey of Agriculture and Horticulture[2]. The authors of this review were advised that there were fewer than five agricultural holdings within the catchment provided, and so no livestock population data could be provided to prevent disclosure of information about individual holdings.

The principal route of contamination of coastal waters by livestock is surface runoff carrying faecal matter. The change in land cover of the Porthallow Catchment between 2012 and 2018 is shown in Figure 3.2. The figure confirms the conclusions of Section 3.1, that the catchment is very rural with the overwhelming majority of land reserved for either pastural or arable farming. The figure does show that the land immediately adjacent to the main watercourse of the area, Porthallow Stream, is pastural farmland. Whilst the population of livestock in the catchment is likely to be small, there may be some risk from agricultural pollution due to connectivity of Porthallow Stream to the CZ, particularly during periods of heavy rainfall. Pasture areas adjacent to shorelines can represent the greatest contamination risk to the classification zones. This is due to run-off from the land travelling less distance before reaching the CZs, resulting in less dilution and *E. coli* die off. Run-off

[2] 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.

from rivers further up the catchment will have a lower risk of contamination to the CZs, because the increased distance will result in further dilution and *E. coli* die off.

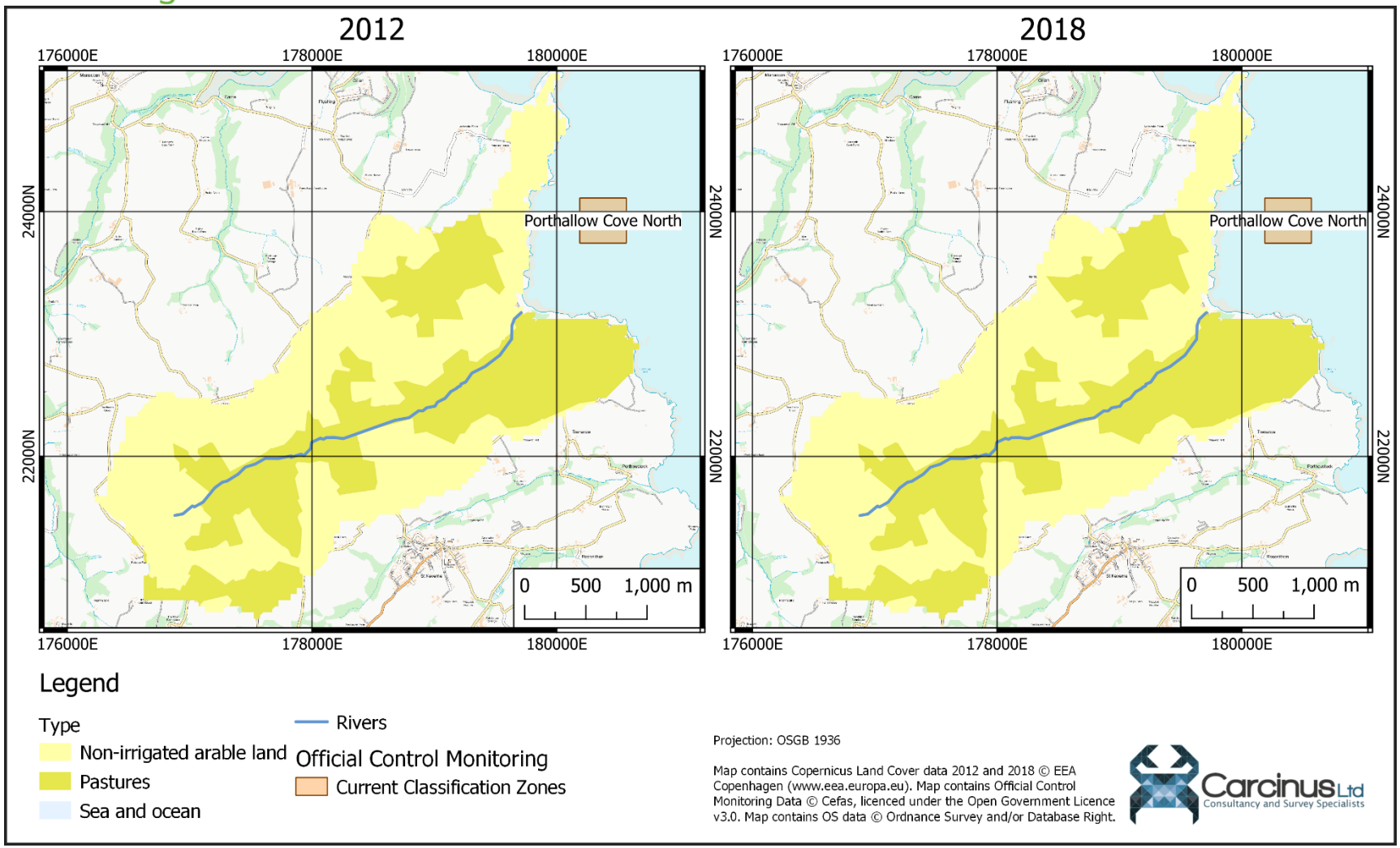

Figure 3.2 Land cover change between 2012 and 2018 for the Porthallow catchment.

The Shellfish Water Action Plan for the Porthallow Shellfish Water states that there are 10 farms in the catchment, most of which are arable. Arable farmland can also represent a risk to the bacteriological health of a shellfishery, particularly where slurry is applied to fields. The spreading of slurry to fields is controlled under the Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018, known as the Farming Rules for Water, which came into force in April 2018. This legislation lays out a set of rules that require good farming practice, so that farmers manage their land both to avoid water pollution and benefit their business. Rules include requiring farmers to judge when it is best to apply fertilisers, where to store manures and how to avoid pollution from soil erosion. Furthermore, silage and slurry storage for agricultural purposes is subject to The Water Resources (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 (SSAFO). All farmers must comply with the SSAFO regulations when building new slurry stores, or substantially altering (e.g., enlarging) existing ones. All stores must be built at least 10 m from any watercourse, including field drains or ditches, and be built or altered to last for at least 20 years with proper maintenance. During initial consultations, the EA stated that there are no local agreements or restrictions in the Porthallow catchment relating to slurry storage and application beyond the national legislation described above. St Keverne (an area to the south of Porthallow Cove which includes part of the catchment considered in this report) is designated as a Nitrate Vulnerable Zone. This designation means that farms in this area have additional rules and restrictions, such as closed periods for spreading slurry over winter and a requirement for a minimum of 5 months slurry storage. The risk of slurry-related runoff is therefore highest in Spring and Autumn months.

Whilst the livestock population of the catchment is likely to be relatively small, bacteriological contamination from agriculture is likely to form one of the most significant sources of contamination to this shellfish water, particularly following significant rainfall events. This is because the majority of the land within the catchment is farmland. However, the areas of farmland have not changed since the 2009 Sanitary Survey was published. Contamination from agricultural sources should be taken into consideration in any updated sampling plan.

3.4 Wildlife

Overwintering and wading birds often represent a potentially significant source of microbiological contamination to shellfisheries because the birds frequently forage (and therefore defecate) directly on intertidal shellfish beds. The 2009 Sanitary Survey concluded that these birds were unlikely to represent a source of contamination to this shellfishery as no roosting birds were observed in the shellfishery during the shoreline survey. The British Trust for Ornithology (BTO) do not hold count data for Porthallow Cove, but the five year average count of overwintering waterbirds (including gulls and terns) for the Helford Estuary (3 km north) is only 373 in the years to 2021/22 (Austin *et al.*, 2023). Some occasional contamination may occur, and is likely to be highest in winter months, but does not need to be taken into consideration in the placement of RMPs for this BMPA.

Marine mammals such as seals may also contribute some contamination, particularly when foraging in the area. However, the area is not considered to be a significant habitat for this group and so any contamination will be occasional and minimal, and does not need to be taken into consideration in the placement of RMPs for this BMPA.

3.5 Boats and Marinas

The discharge of sewage from boats is a potentially significant source of contamination to the shellfish beds within BMPAs. Boating activities in the vicinity of the Porthallow BMPA have been derived through analysis of satellite imagery and various internet sources, and compared to that described in the 2009 Sanitary Survey.

There continues to be no dedicated harbour within Porthallow Cove. Satellite imagery indicates that there are a number of small vessels winched above high water when not in operation. There are no registered fishing vessels in the area. The Cove is marked as a safe anchorage on nautical charts, and so it is possible that pleasure craft make the journey from either the Helford River or Fal Estuary to the cove. Vessels of a sufficient size to contain on board toilets may make overboard discharges when moored overnight or moving to and from the anchorage. The marked anchorage is to the south west of the mussel farm, and so contamination may be carried over the shellfish beds on an ebbing tide.

Comparison with the situation described in the 2009 Sanitary Survey suggests that overall, the level of boating activity in the area remains similar, and there is a chance that the main areas of moorings will receive some contamination, particularly in the summer. However, the recommendations made in the 2009 report remain valid as the areas at risk have not changed.

3.6 Other Sources of Contamination

Utility misconnections are when foul water pipes are wrongly connected and enter surface waters without treatment, potentially putting raw sewage directly into watercourses via surface water drains. The Shellfish Water Action Plan for this area describes that due to the remote nature of the shellfish water, no impacts from utility misconnections are expected.

There are footpaths adjacent to Porthallow Cove and dog walking along the beach is likely to take place. Overall, the risk of this source of contamination is considered to be like that described in the 2009 Sanitary Survey and no update to the sampling plan is required on this basis.

4 Hydrodynamics/Water Circulation

The main watercourse in the area is Porthallow Stream, which can be considered to be a point source of pollution carrying contamination from farther up the catchment into the BMPA. The mouth of the stream is 750 m south west of the CZ. Tidal ranges in the area are large, with a Spring range of 4.7 m and a Neap range of 2.3 m. Ebbing tides will serve to carry contamination from shoreline sources over the CZ, and flooding tides may carry contamination from offshore sources, but this contamination is likely to be more dilute.

There is no evidence that the patterns of water movement within Porthallow Cove will have changed significantly since the 2009 Sanitary Survey was published. No update to the sampling plan is necessary, as the recommendations made in the 2009 Sanitary Survey to account for the impact of water circulation within the Cove continue to be valid.

5 Rainfall

A complete record of rainfall data from the Penryn rain gauge at SW 77699 33599 (ID: 379706) was downloaded from the Environment Agency's hydrology data explorer[3]. This station was chosen because it is the closest monitoring station with rainfall data for dates both preceding and following the 2009 Sanitary Survey. It is located 10 km north of the BMPA. The data were subdivided into the period 2001 – 2008 (pre sanitary survey) and 2009 – 2023 (post sanitary survey) and processed in R (R Core Team, 2021). These data were used to determine whether any changes in rainfall patterns had occurred since the 2009 Sanitary Survey was published. The rainfall data are summarised in Table 5.1 and rainfall levels per month are shown in Figure 5.1.

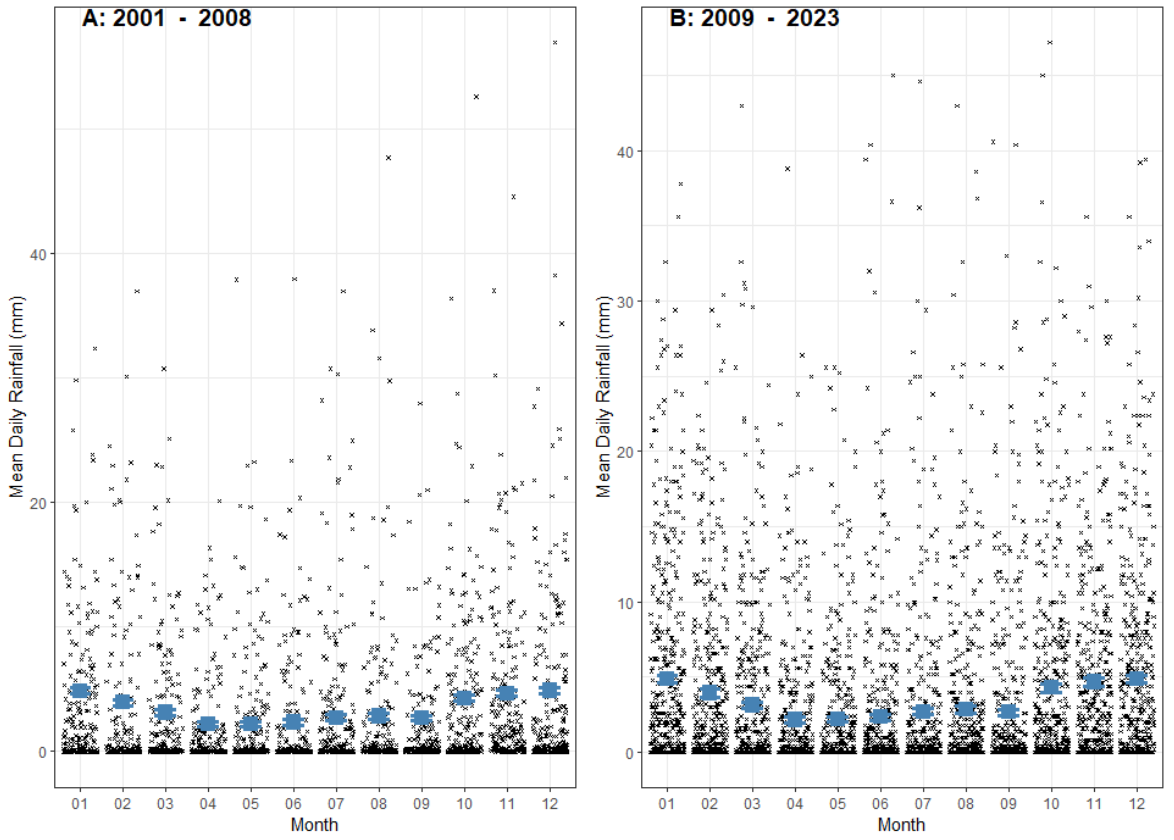

Figure 5.1 Mean daily rainfall per month at the Penryn (NGR: SW7030819997) monitoring station for the period (A) 2001 – 2008 and (B) 2009 – 2023.

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

Table 5.1 Summary statistics for the period preceding and following the 2009 Sanitary Survey from the Penryn rain gauge.

Period	Mean Annual Rainfall	Percentage Dry Days	Percentage Days Exceeding 10 mm	Percentage Days Exceeding 20 mm
2001 - 2008	988.125	39.728	33.08	20.465
2009 - 2023	1231.417	37.831	36.469	22.483

The data show that the mean annual rainfall in the area has increased by approximately 250 mm per year, with the percentage of dry days falling and the percentage of days with heavy (>10 mm/day) rainfall increasing. The area is also notably 'wetter' than other areas of the country, suggesting that the impact of land runoff is likely to be higher than other areas. Two sample t-tests indicated that there was no significant difference ($p > 0.05$) in the mean daily rainfall per month for the 2001 – 2008 and 2009 – 2023 periods.

Rainfall leads to increased faecal loading through two factors: elevated levels of surface runoff and increased spill events from intermittent discharges, particularly during periods of heavy rain (>10 mm/day) or extremely heavy (>20 mm/day) 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 Official Control Monitoring

6.1.1 Summary Statistics and geographical variation

Mean Official Control monitoring results for *E. coli* concentrations at RMPs sampled in the Porthallow 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 is freely available on the datahub[1].

A total of two RMPs have been sampled in the Porthallow BMPA since 2010. Both of these were recommended for creation in the 2009 Sanitary Survey as there was no active shellfishery prior to this date. Sampling at the Porthallow South (B034Z) RMP stopped in 2010. Sampling at the Porthallow North (B34AA) stopped in 2012, and restarted in 2017 following the recommendations of the pRMP assessment (Carcinus, 2017).

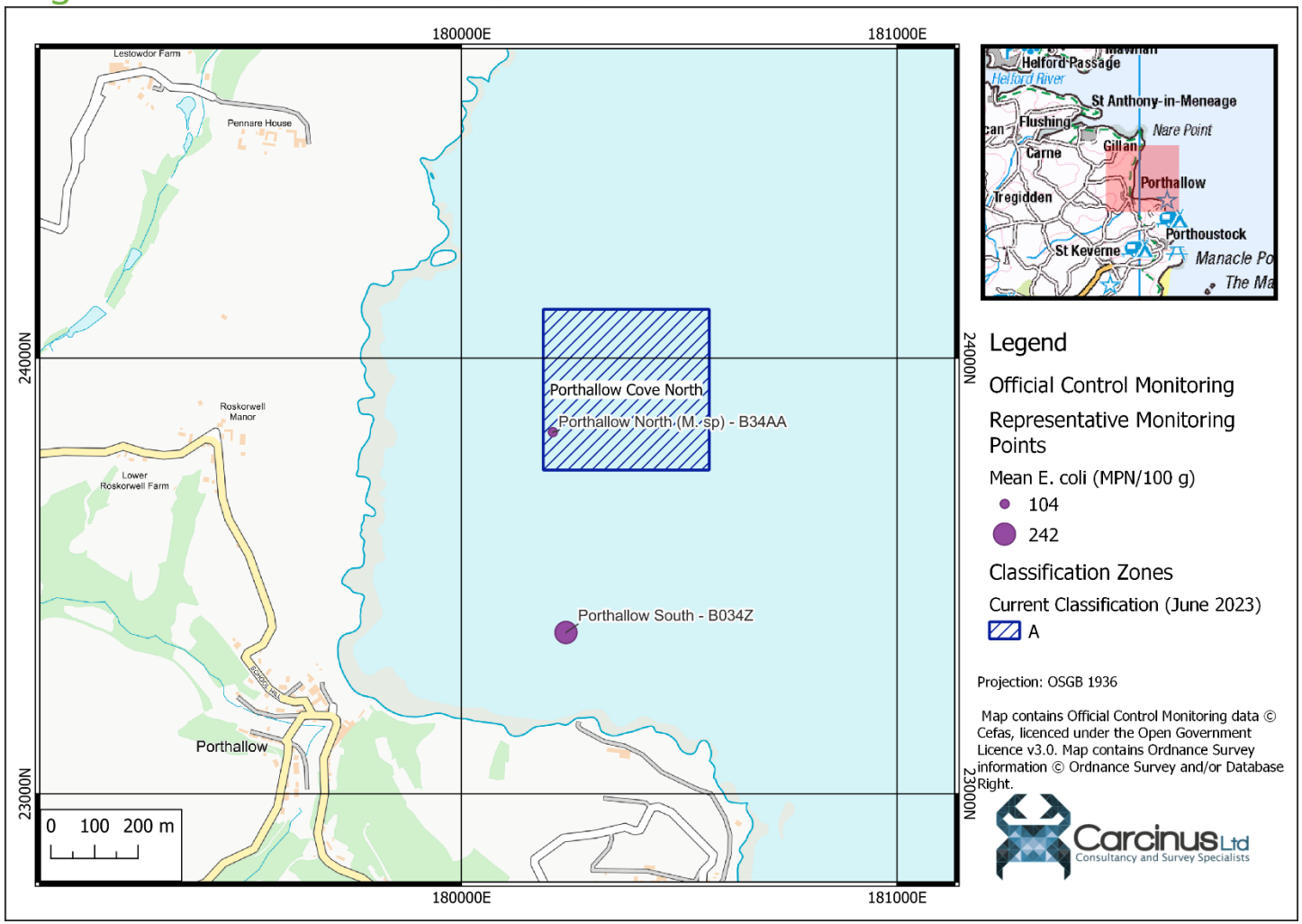

Figure 6.1 Mean E. coli results from Official Control Monitoring at bivalve RMPs in the Porthallow BMPA.

Table 6.1 Summary statistics of Official Control monitoring at bivalve RMPs in the Porthallow Cove BMPA.

RMP (Species)	NGR	Species	No.	First Sample	Last Sample	Mean	Min Value	Max Value	% > 230	% > 4,600	% > 46,000
Porthallow North (M. sp) - B34AA	SW 8021 2383	Mussel	87	10/08/2010	07/06/2023	104.92	18	3300	8.046	0	0
Porthallow South - B034Z	SW 8024 2337	Mussel	5	18/01/2010	01/06/2010	242	20	1100	20	0	0

Monitoring results from the two RMPs have been generally good, with neither RMP ever returning a result above the 4,600 *E. coli* MPN/100 g threshold, and less than 10% of results from the Porthallow North RMP (B34AA) exceeding 230 MPN/100 g. Monitoring results from the Porthallow South RMP (B034Z) have indicated higher concentrations of *E. coli* in samples than from the other RMP, most likely because Porthallow South B034Z is closer to the mouth of Porthallow Stream which is considered to carry most contamination from this catchment into Porthallow Cove.

Figure 6.2 presents box and violin plots of *E. coli* monitoring at RMPs within the Porthallow Cove BMPA. One-way analyses of variance (ANOVA) tests were performed on the data to investigate the statistical significance of any differences between the monitoring results from the two RMPs. Significance was taken at the 0.05 level. All statistical analysis described in this section was undertaken in R (R Core Team, 2021). The monitoring data indicates that the median values for both RMPs are 20, close to the limit of detection. There are no significant differences between the monitoring results from each RMP ($p > 0.05$). A p-value of less than 0.05 means that there is a greater than 95% probability that the observed differences between the groups being compared hasn't occurred by chance alone.

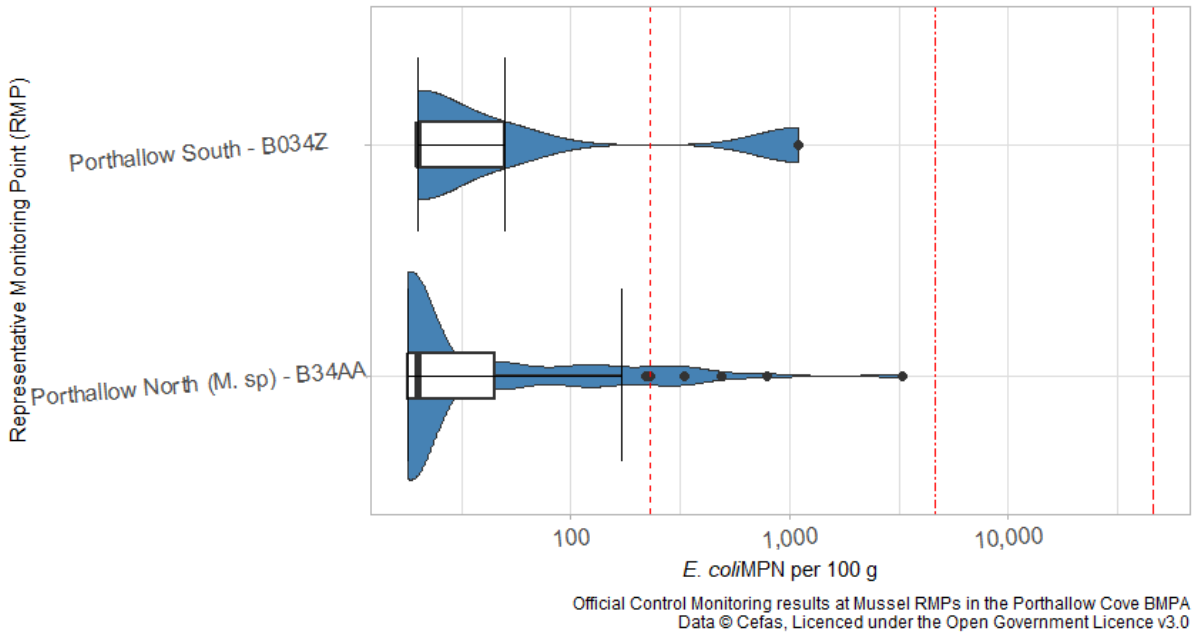

Figure 6.2 Box and violin plots of E. coli concentrations at mussel RMPs sampled in the Porthallow Cove BMPA since 2010. Central line indicates median value, box indicates lower-upper quartile range and whisker indicates minimum/maximum values, excluding outliers. Boxplots are overlaid on the distribution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

6.1.2 Overall temporal pattern in results

The overall temporal pattern in shellfish flesh monitoring from the Porthallow Cove RMPs is shown in Figure 6.3.

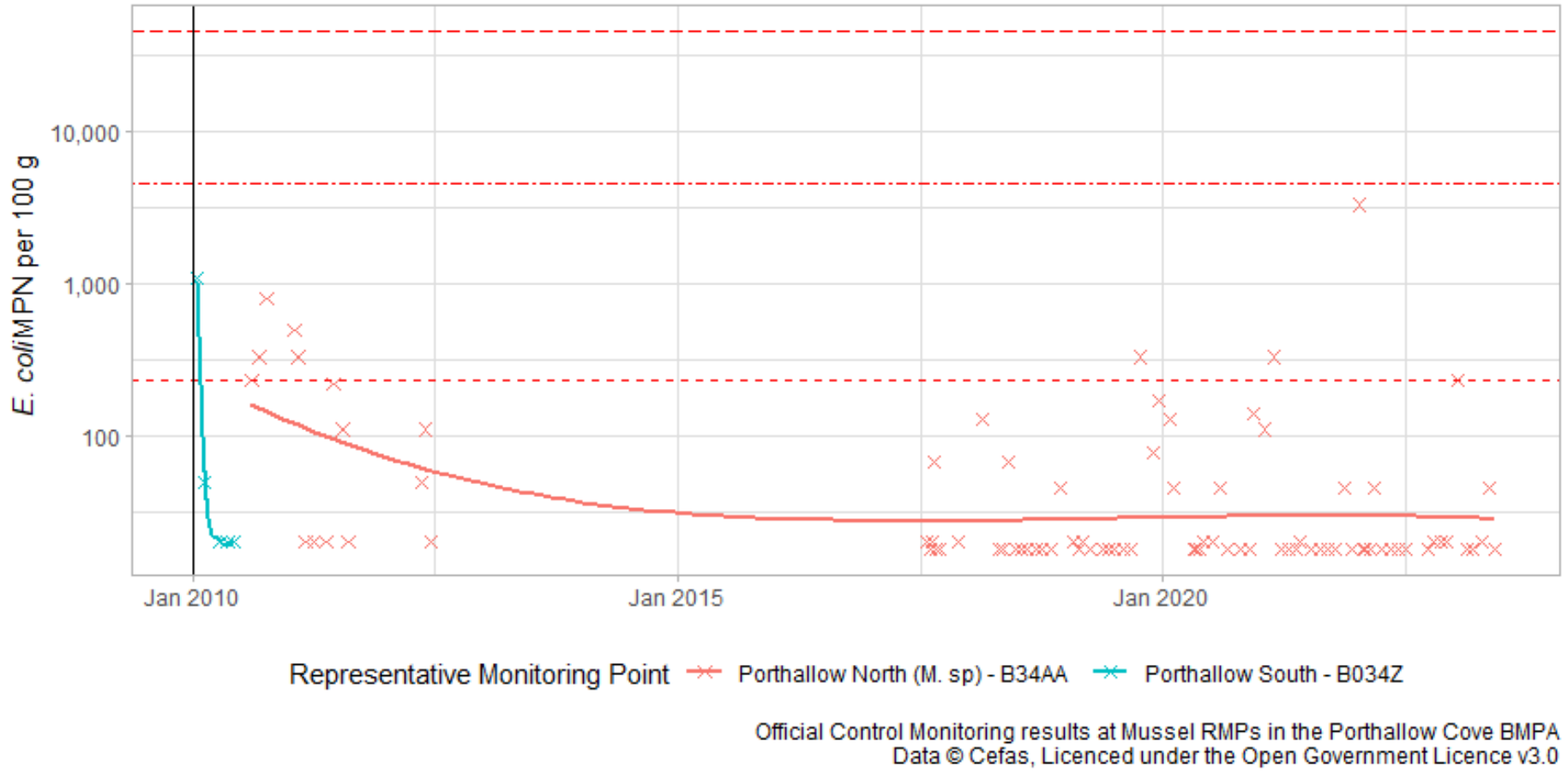

Figure 6.3 Timeseries of E. coli levels at mussel RMPs sampled in the Porthallow BMPA since 2010. Scatter plots are overlaid with a loess model fitted to the data. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 MPN/100 g respectively.

The monitoring from the Porthallow North RMP indicate that generally, concentrations of *E. coli* have been low, with the loess trend consistently falling well below the 230 *E. coli* MPN/100 g threshold. The trend is also stable with no significant increases or decreases in the levels of contamination observed.

6.1.3 Seasonal patterns of results

Seasonal patterns of *E. coli* levels at RMPs in the Porthallow Cove BMPA were investigated and are shown in Figure 6.4. The data for each year were averaged into the four seasons, with, spring from March – May, summer from June – August, autumn from September – November and winter comprising data from December – February the following year. Two-way ANOVA testing was used to look for significant differences in the data, using both season and RMP (if there is more than one RMP for a given species) as independent factors (i.e., pooling the data across season and RMP respectively), as well as the interaction between them (i.e., exploring seasonal differences within the results for a given RMP). Significance was taken at the 0.05 level.

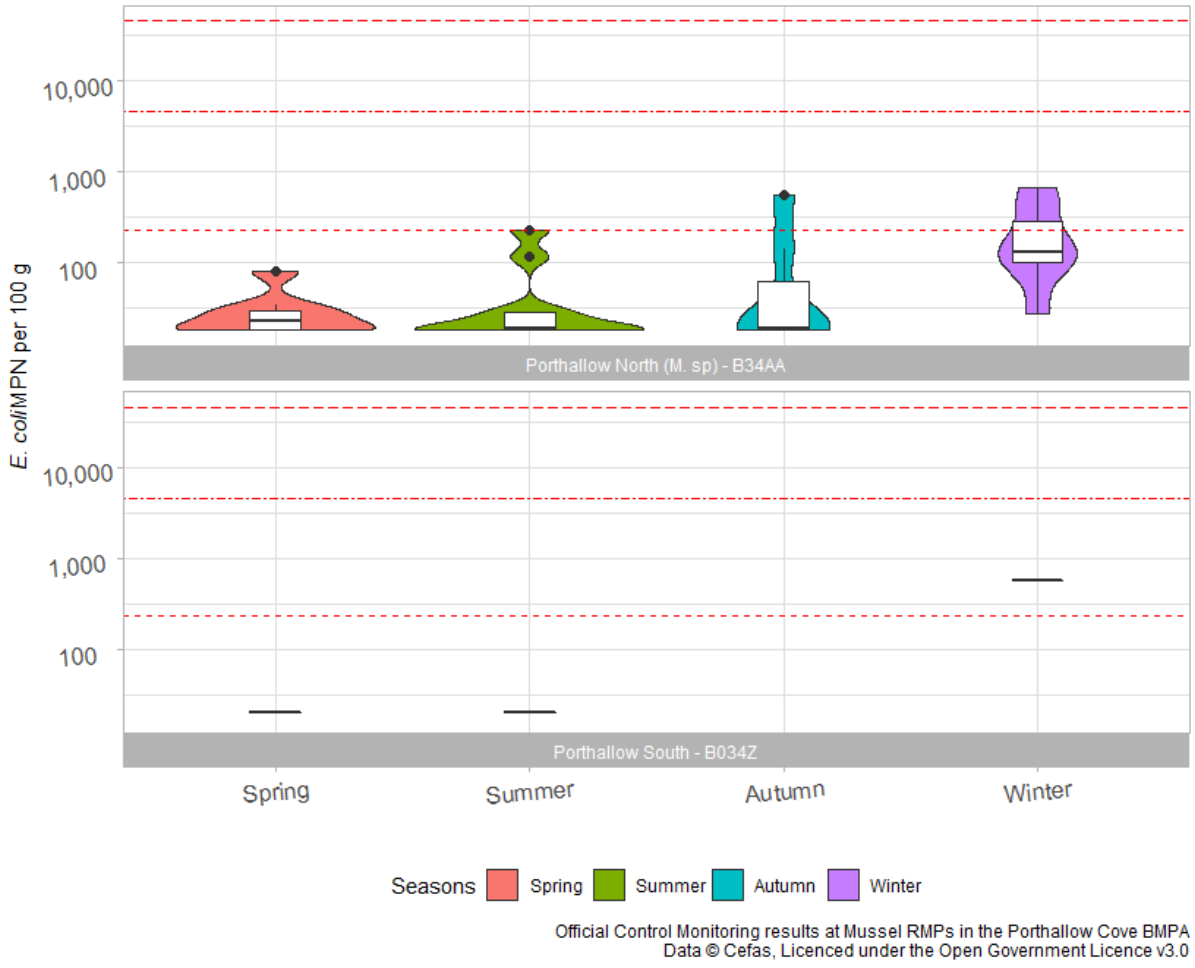

Figure 6.4 Box and violin plots of E. coli levels per season at mussel RMPs in the Porthallow Cove BMPA since 2010. Horizontal lines indicate classification thresholds at 230, 4,600 and 46,000 E. coli MPN/100 g.

No comparison for the Porthallow South B034Z RMP was possible as only five samples were collected. No significant differences were found in the data from Porthallow North B34AA, but the monitoring results collected in winter months tended to be higher than at other times of year. This is likely due to the increased rainfall levels at this time of year causing additional runoff.

6.2 Bathing Water Quality Monitoring

The status of EC bathing waters near to and within the BMPA is also of relevance to this review. There is a bathing water quality monitoring point at SW 7974 2326, which has been consistently classified as 'Excellent' since 2015 (when the current classification system began). It should be noted that bathing water sampling only occurs during the summer period (May to September inclusive) and therefore may not represent the potential for increased faecal loading during winter months. However, bathing water quality results do provide an indication of water quality in the area during the bathing water season.

6.3 Action States

Since the publication of the 2009 Sanitary Survey, the following action states have been triggered within the BMPA.

- On 12 January 2022 a result of 3,300 *E. coli* MPN/100 g was recorded at Porthallow Cove North (B34AA) RMP. Subsequent action state sampling on 26 January and 02 February returned results at the limit of detection for *E. coli* sampling (18 *E. coli* MPN/100 g). The following monthly sample, collected on 23 February 2022, also returned a result at the limit of detection. There were no grounds for waiving the result.

The investigations that followed this action state event described that there was heavy (but not exceptional) rainfall in the days preceding the action state result. This confirms the findings of this review that surface runoff following periods of high rainfall are a significant source of pollution within this shellfishery. Consideration should be given to the position of the mouth of the Porthallow Stream in any updated sampling plan.

7 Conclusion and overall assessment

Porthallow Cove is a small cove situated on the east coast of the Lizard Peninsula in Cornwall. It is 3 km south of the Helford Estuary and 10 km south of the Fal Estuary complex, both of which support their own classified shellfish harvesting areas. There is currently one small CZ covering an aquaculture operation in the area. There are no byelaws that apply to the harvest of mussels from the area, but the aquaculture operation is subject to the terms of a Crown Estate licence. The current output from this shellfishery is 50 – 80 tonnes per annum. From information provided during initial consultations, we understand that there are wild stocks of razor clams in the area, but there are no plans to pursue a classification for this species.

The results of the 2021 Census were compared to that of the 2011 Census to give an indication of changes in human population in the catchment. At the 2021 Census, the estimated population of the catchment was 1,469 people (an increase of 1.3%). The village of Porthallow is positioned immediately adjacent to the shoreline, and so may contribute some urban runoff, although the EA do not consider utility misconnections to be a significant issue in the catchment. The area receives a significant seasonal influx of tourists during summer months, although the authors of this review have received no information to date to suggest that the existing wastewater treatment network is insufficient to handle this increase.

The wastewater treatment network in the area is relatively sparse, with only one continuous discharge and one intermittent discharge within the Porthallow catchment. No upgrades to the treatment methodology at this discharge has occurred, although information received during initial consultation suggests that in recent years many properties in the area have been connected to this STW, meaning that the overall bacteriological contamination in the area will have reduced. EDM data suggests that the intermittent discharge spills very infrequently (with no spills in either 2021 or 2022). An investigation into the overall contribution of various sources of microbiological contamination to the Porthallow Shellfish Water is due to be undertaken during AMP8 (2025 – 2030). The impact of sewage discharges in the area is considered to be minimal, and no update to the sampling plan is necessary on this basis.

No livestock data could be provided by Defra to prevent disclosure of information about individual farms, as there are fewer than five livestock holdings in the catchment. Land cover data does show that most of the land surrounding the estuary is agricultural, both arable and pasture. The 2021 Shellfish Water Action Plan states that there are approximately 10 farms in the catchment. Heavy rainfall is likely to lead to agricultural runoff entering the main watercourse (Porthallow Stream) in the area and potentially impacting the shellfish CZ.

Waterbirds are not considered to be a significant source of pollution to this estuary, as population numbers are very small and the shellfish CZ is not positioned on the intertidal. This situation has not changed since the 2009 Sanitary Survey was published, and therefore no update to the sampling plan is necessary on this basis.

There continues to be no recognised harbour within Porthallow Cove, although the area is likely to be a popular anchorage for pleasure craft from either the Helford or Fal estuaries. Some microbiological contamination from vessels of a sufficient size to contain onboard toilets may occur, particularly in summer months. This situation is as described in the 2009 Sanitary Survey and no update to the sampling plan is necessary on this basis.

Monitoring results collected at the currently sampled RMP suggests that contamination levels are generally quite low in the vicinity of this shellfishery. No significant seasonal differences in the monitoring data were found, although results from winter months were

generally slightly higher than those at other times of year. This supports the conclusion that rainfall-stimulated surface runoff is a significant source of pollution in this BMPA.

Based on the information available, there do not appear to be any significant knowledge gaps that would justify a shoreline survey.

Having reviewed this report, the FSA agree that a shoreline survey is not required.

8 Recommendations

Recommendations for the current classification zone within the Porthallow Cove BMPA is described below and summarised in Table 9.1.

8.1 Mussels

8.1.1.1 Porthallow North

This CZ covers an area of 0.14 km² and is situated in the northern part of Porthallow Cove. The 2009 Sanitary Survey did not recommend the use of an RMP for this CZ, instead saying it should be classified based on results from the Porthallow South B034Z RMP. When sampling stopped at this RMP in June 2010, sampling began at the Porthallow North RMP. The main source of contamination to the shellfishery is likely to be the Porthallow Stream, carrying pollution from the Porthallow Sewage Treatment Works and Pumping station, as well as any surface runoff from farther up the catchment. The current RMP, located in the south-western part of the CZ, is considered to be in an appropriate position to capture the contamination from the Porthallow Stream and should be retained moving forward.

9 General Information

9.1 Location Reference

Production Area	**Porthallow Cove**
Cefas Main Site Reference	M034
Ordnance survey 1:25,000	Explorer TM103
Admiralty Chart	Imray No 2400.11

9.2 Shellfishery

Species	Culture Method	Seasonality of Harvest
Mussels (*Mytilus* spp.)	Cultured	Year Round

9.3 Local Enforcement Authority(s)

Name	Cornwall Porth Health Authority The Docks Falmouth TR11 4NR
Website	https://www.cornwall.gov.uk/environment/cornwall-port-health-authority/
Telephone number	01872 323090
E-mail address	porthealth@cornwall.gov.uk

9.4 Sampling Plan

*Table 9.1 Proposed sampling plan for the Porthallow Cove 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
Porthallow North	B34AA	Porthallow North	SW 8021 2383	50°04.23'N, 05°04.26'W	Mussels	Rope	Bagged	*Mytilus* spp.	10 m	Monthly

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Appendices

Cefas

EC Regulation 854/2004

CLASSIFICATION OF BIVALVE MOLLUSC PRODUCTION AREAS IN ENGLAND AND WALES

SANITARY SURVEY REPORT

Porthallow Cove (Cornwall)

2009

Follow hyperlink in image to view full report

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