

Water Quality Monitoring Report: Stanley Harbour and Rookery Bay (2025)



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**Falkland Islands Government
Environment Department**

Contents

Contents.....	2
Summary.....	3
1 Introduction.....	4
2 Materials and method.....	4
3 Results.....	6
3.1 Overview of 2025 water quality	6
3.2 Specific historical standards.....	7
3.2.1 Coliforms.....	7
3.2.2 Escherichia coli.....	10
3.2.3 Enterococci.....	14
4 Discussion	19
5 Conclusion	20
6 References	21
7 Appendices	22

Summary

Water quality is a critical component of public health and environmental protection in the Falkland Islands. This report presents results from monitoring fecal indicator bacteria (coliforms, *Escherichia coli*, and Enterococci) at seven coastal sites in Stanley Harbour and Rookery Bay throughout 2025, with comparative analysis against a 2021-2024 baseline. Monitoring focused on locations proximate to sewage outfalls to assess recreational water safety and environmental health.

Key 2025 Findings: Monument South (SH3) exhibited severe, persistent contamination across all three bacterial indicators, with complete non-compliance (0%) with WHO standards for *E. coli* in all four seasons. Canache (SH6) experienced deterioration with coliform concentrations increasing by up to 2,196% compared to 2021-2024 baseline. Beach Centre (RB1), Whalebone Cove (SH1), and Public Jetty North (SH5) maintained excellent water quality with 100% compliance. East Stanley South (SH2) showed variable seasonal compliance ranging from 0% to 100%.

Bacterial concentrations at two locations (SH3 and SH2) consistently exceeded safe limits established by the World Health Organization (WHO, 2018) and the EU Blue Flag Programme. In the absence of Falkland Islands-specific regulations, international standards were applied. Results have been shared with the FIG Public Works Department and FIG Public Health Unit. Public health advisories against recreational water contact at contaminated sites remain in effect and should be reinforced with visible signage.

1 Introduction

Water testing is carried out for two main purposes in Stanley Harbour, to establish the level of pollution that is occurring in a natural environment, and to assess whether it is safe for recreational use. Here, water quality is tested for the levels of coliform bacteria, *Escherichia coli* and enterococci that result from sewage outfall and/or agricultural waste McMinn et al. (2017). Establishing a monitoring regime provides an understanding of pollution to preserve, protect and improve the quality of human health and the environment Tazoe (2023). It also helps to provide early warnings where pollution may pose a threat to the environment or public health.

Water quality monitoring in coastal areas around Stanley establishes a baseline against which to benchmark progress of future sewage management measures, and also to be able to provide advice on the basis of the results to the public and other FIG departments. Water tests have been carried out in coastal waters around Stanley, which are in the proximity of sewage effluents, to ensure good water quality as members of the public use the water for recreational purposes. Contamination of water bodies by sewage, including faecal matter and associated microorganism and pathogens, can have health and environmental impacts.

Faecal contamination in water can introduce a range of harmful agents, including enteric viruses, coliphages, infectious microorganisms, and other pathogens commonly associated with sewage pollution. Exposure to contaminated water whether through bathing or accidental ingestion has been consistently linked to adverse health outcomes. These include gastrointestinal illnesses, respiratory infections, and other waterborne diseases, all of which are strongly associated with the presence of faecal indicators and enteric pathogens in the environment Mertens et al. (2023).

This report provides a summary of water quality conditions in and around known sewage outfall sites in Stanley Harbour and Rookery Bay. It draws on the results of a five-year coastal water quality monitoring, established to build a baseline understanding of coliform levels and other indicators of faecal contamination. Although improved sewage management systems are not yet in place, the long-term dataset generated through this monitoring will be essential for assessing how future changes to sewage treatment and discharge practices influence bacterial levels in the marine environment. The monitoring also supports public guidance on activities such as bathing and water-based recreation by providing evidence on potential health risks associated with exposure to contaminated water.

2 Materials and method

As part of the ongoing monitoring programme, water samples were analysed for Coliforms, *Escherichia coli*, and Intestinal Enterococci, which are indicators of sewage contamination. Seven sites were monitored: six around Stanley Harbour and one at Rookery Bay. One site has consistently remained well below guideline thresholds since the start of the programme, so from 2025 it is sampled only twice a year (winter and summer). A new site was also added in the Canache at the request of a local youth group planning to develop a sailing programme,

to ensure the area is safe for recreational use (Figure 1). In addition to the sample collection, data was collected on weather (temperature, precipitation, tidal and wind direction). These sites are classified as coastal waters, meaning they are influenced by normal tidal and salinity conditions.

There is currently no regulation or guidance for coastal water quality in the Falkland Islands, therefore, the standards from the international Blue Flag programme and World Health Organisation (WHO) were used as guidelines to assess the quality of the coastal water (Table 1)

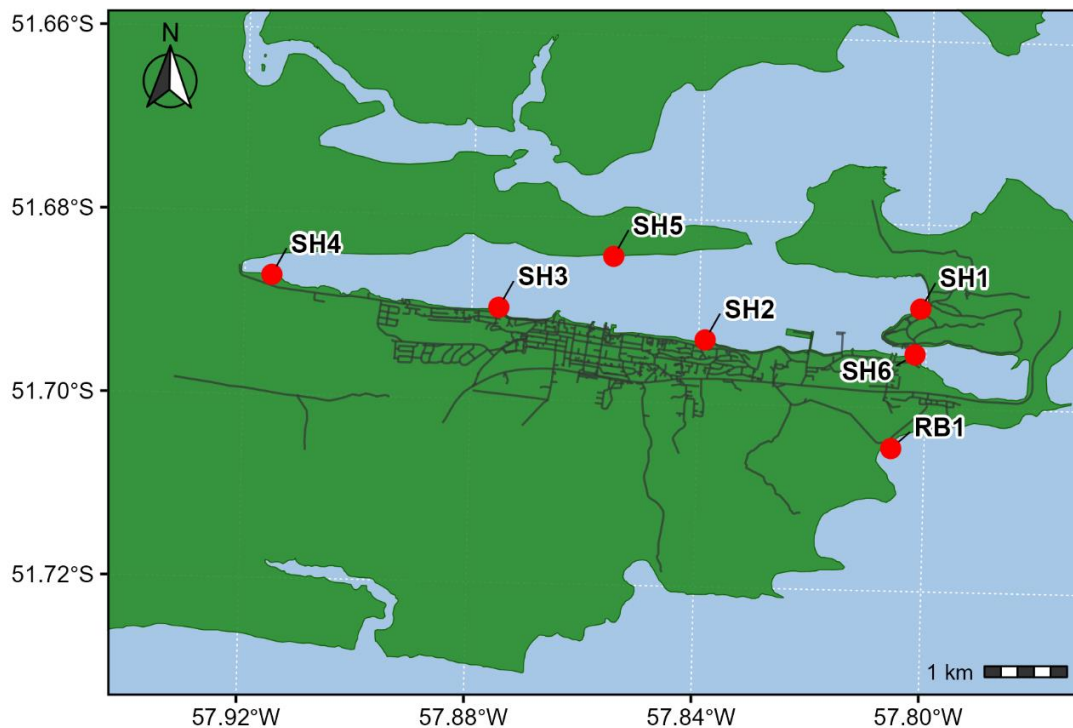


Figure 1: Map of Stanley harbour and surrounds showing locations where water samples were collected. RB1: Beach Centre; SH1: Whalebone Cove; SH2: East Stanley South; SH3: Monument South; SH4: Moody Brook; SH5: Public Jetty North; SH6: Canach.

Water tests were undertaken by staff members of the FIG Environment Department. To capture seasonal variation, samples were collected throughout 2025. The summer sampling occurred on 29 January, followed by an autumn collection on 10 April. Winter samples were gathered on 28 July, and the final sampling event took place on 27 October during the spring season.

At each site, 250 ml water sample was collected using a sterilised bottle. The bottle was submerged to about 30 cm below the surface and filled, while keeping it roughly 10 cm above the seabed to avoid disturbing sediment. Once collected, the bottles were closed, placed in a cool bag to keep the temperature stable, and labelled with the date and location. This same procedure was followed at all sites.

All samples were processed by the Falkland Islands Government Food, Water and Environment Laboratory within 24 hours. Tests for *E. coli* and coliforms were carried out using BS EN ISO 9308-1:2014, and Enterococci were tested using BS EN ISO 7899-2:2000. Results are reported as colony-forming units (CFU) per 100 ml.

Table 1. Coastal water quality guidelines for recreational waters based on WHO (2018) standards. Fecal indicator bacteria concentrations (CFU/100 mL) are assessed using percentile values (90th and 95th percentiles) to classify water quality as poor, sufficient, good, or excellent. Source: WHO (2018)

Indicator	Classification	Concentration	Classification
Enterococci	90th	>185 cfu/100 ml	Poor
Enterococci	90th	<185 cfu/100 ml	Sufficient
Enterococci	95th	<200 cfu/100 ml	Good
Enterococci	95th	<100 cfu/100 ml	Excellent
<i>E. coli</i>	90th	>500 cfu/100 ml	Poor
<i>E. coli</i>	90th	<500 cfu/100 ml	Sufficient
<i>E. coli</i>	95th	<500 cfu/100 ml	Good
<i>E. coli</i>	95th	<250 cfu/100 ml	Excellent

The percentile classifications used in this report follow the approach developed for coastal bathing waters in the United Kingdom. These classifications are based on test results collected over four bathing seasons, meaning that individual measurements are not assessed in isolation. Instead, the overall classification reflects the combined performance of all results across this multi-year period, providing a more reliable indication of long-term water quality rather than short-term fluctuations.

3 Results

Water quality monitoring in 2025 revealed persistent spatial heterogeneity in fecal contamination across Stanley's seven coastal monitoring sites. This section presents 2025 findings for each bacterial indicator, followed by temporal trend analysis comparing 2025 results to the 2021-2024 baseline period.

3.1 Overview of 2025 water quality

In 2025, seven monitoring sites were sampled across four seasons (summer, autumn, winter, spring), generating 72 samples. Water quality assessments against WHO (2018) standards revealed two sites classified as poor: Monument South (SH3) and East Stanley South (SH2) with persistent exceedances. Five sites classified as good to excellent: Beach Centre (RB1), Whalebone Cove (SH1), Moody Brook (SH4), Public Jetty North (SH5), and Canache (SH6) (Table 2).

Compliance analysis for 2025 revealed sharp contrasts between monitoring sites. For *Escherichia coli*, Monument South (SH3) experienced complete non-compliance with 0% of samples meeting the WHO 'Sufficient' threshold (<500 CFU/100 mL) across all four seasons, representing complete year-round failure. East Stanley South (SH2) demonstrated highly

variable seasonal compliance with 100% compliance in three seasons (summer, winter, spring) but complete failure in autumn (0%), indicating episodic contamination events. All other sites (RB1, SH1, SH4, SH5, SH6) achieved perfect *E. coli* compliance (100%) throughout 2025. *Enterococci* compliance patterns differed notably, with Monument South achieving 100% compliance in summer and spring but failing completely in autumn and winter (0%), while East Stanley South maintained 100% compliance year-round (Figure 2).

Table 2. Fecal indicator bacteria concentrations (CFU/100 mL) at seven monitoring locations in Stanley, Falkland Islands, 2025. RB1: Beach Centre; SH1: Whalebone Cove; SH2: East Stanley South; SH3: Monument South; SH4: Moody Brook; SH5: Public Jetty North; SH6: Canach. Empty cells indicate no data collected. CFU = Colony Forming Units.

Year	Season	Indicator	RB1	SH1	SH2	SH3	SH4	SH5	SH6
2025	Autumn	Coliform	5	2	1,600	2,900	0		46
2025	Spring	Coliform	17	1	170	920	6		15
2025	Summer	Coliform	0	1	1,200	3,700	15	10	310
2025	Winter	Coliform	3	46	480	3,300	37	10	460
2025	Autumn	<i>E. coli</i>	0	1	540	970	0		2
2025	Spring	<i>E. coli</i>	4		50	560	2		7
2025	Summer	<i>E. coli</i>	0	1	92	840	15	9	44
2025	Winter	<i>E. coli</i>	0	8	270	2,000	15	2	130
2025	Autumn	Enterococci	0	0	37	520	0		0
2025	Spring	Enterococci				23			
2025	Summer	Enterococci	0	1	46	68	6	5	12
2025	Winter	Enterococci	0	5	44	310	1	0	41

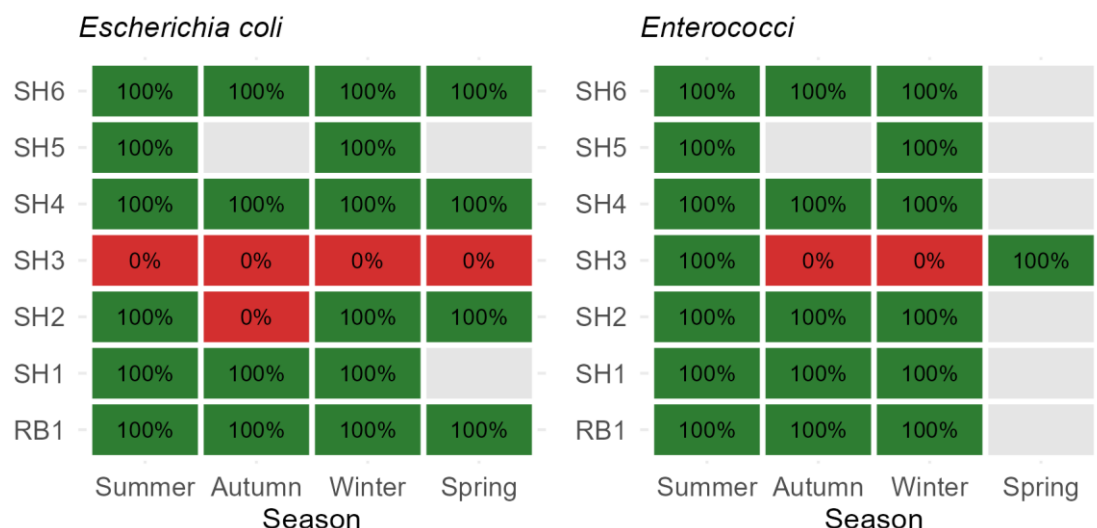


Figure 2. 2025 seasonal compliance with WHO (2018) water quality standards by location and indicator. Grey = no data.

3.2 Specific historical standards

3.2.1 Coliforms

In 2025, coliform levels across Stanley’s monitoring sites ranged from very low at clean reference locations to extremely high at contaminated ones. Beach Centre (RB1) and Whalebone Cove (SH1) generally maintained low concentrations, with only minor seasonal spikes. In contrast, Monument South (SH3) remained the most polluted site, with consistently severe coliform levels far above safety thresholds. East Stanley South (SH2) showed moderate to high contamination throughout the year, while Canache (SH6) recorded unusually high summer and winter values, marking a sharp increase compared with the 2021–2024 baseline. (Table 3Table 3).

Compared with the 2021–2024 baseline, the 2025 results show that Monument North (SH2) and Monument South (SH3) remain the most problematic sites, with persistently high coliform concentrations and large seasonal fluctuations, confirming ongoing contamination in this area. In contrast, other sites showed mixed but generally less severe trends: Beach Centre (RB1) continued to improve, Whalebone Cove (SH1) improved in most seasons except for a winter increase, and Canache (SH6) experienced notable deterioration (Table 3; Figure 3; Figure 4).

Table 3. Seasonal percentage changes in coliform concentrations comparing 2025 values to 2021–2024 baseline averages across seven monitoring locations in Stanley, Falkland Islands. Baseline values represent four-year seasonal means (CFU/100 mL), 2025 values represent single-year seasonal measurements, and percentage changes are calculated as $[(2025 - \text{baseline}) / \text{baseline}] \times 100$.

Location	Season	Coliform		
		2021–2024	2025	Change (%)
RB1	Summer	23.3	0.0	-100%
RB1	Autumn	17.8	5.0	-72%
RB1	Winter	4.6	3.0	-35%
RB1	Spring	37.5	17.0	-55%
SH1	Summer	10.7	1.0	-91%
SH1	Autumn	31.1	2.0	-94%
SH1	Winter	11.8	46.0	289%
SH1	Spring	1.7	1.0	-40%
SH2	Summer	640.9	1,200.0	87%
SH2	Autumn	1,754.8	1,600.0	-9%
SH2	Winter	1,319.2	480.0	-64%
SH2	Spring	217.8	170.0	-22%
SH3	Summer	1,425.0	3,700.0	160%
SH3	Autumn	3,882.5	2,900.0	-25%
SH3	Winter	3,085.2	3,300.0	7%
SH3	Spring	1,267.2	920.0	-27%
SH4	Summer	11.4	15.0	32%
SH4	Autumn	49.6	0.0	-100%
SH4	Winter	24.5	37.0	51%
SH4	Spring	111.2	6.0	-95%
SH5	Summer	22.2	10.0	-55%
SH5	Autumn	27.2		
SH5	Winter	15.6	10.0	-36%

SH5	Spring	5.6		
SH6	Summer	13.5	310.0	2196%
SH6	Autumn	19.3	46.0	138%
SH6	Winter	34.0	460.0	1253%
SH6	Spring	8.0	15.0	88%

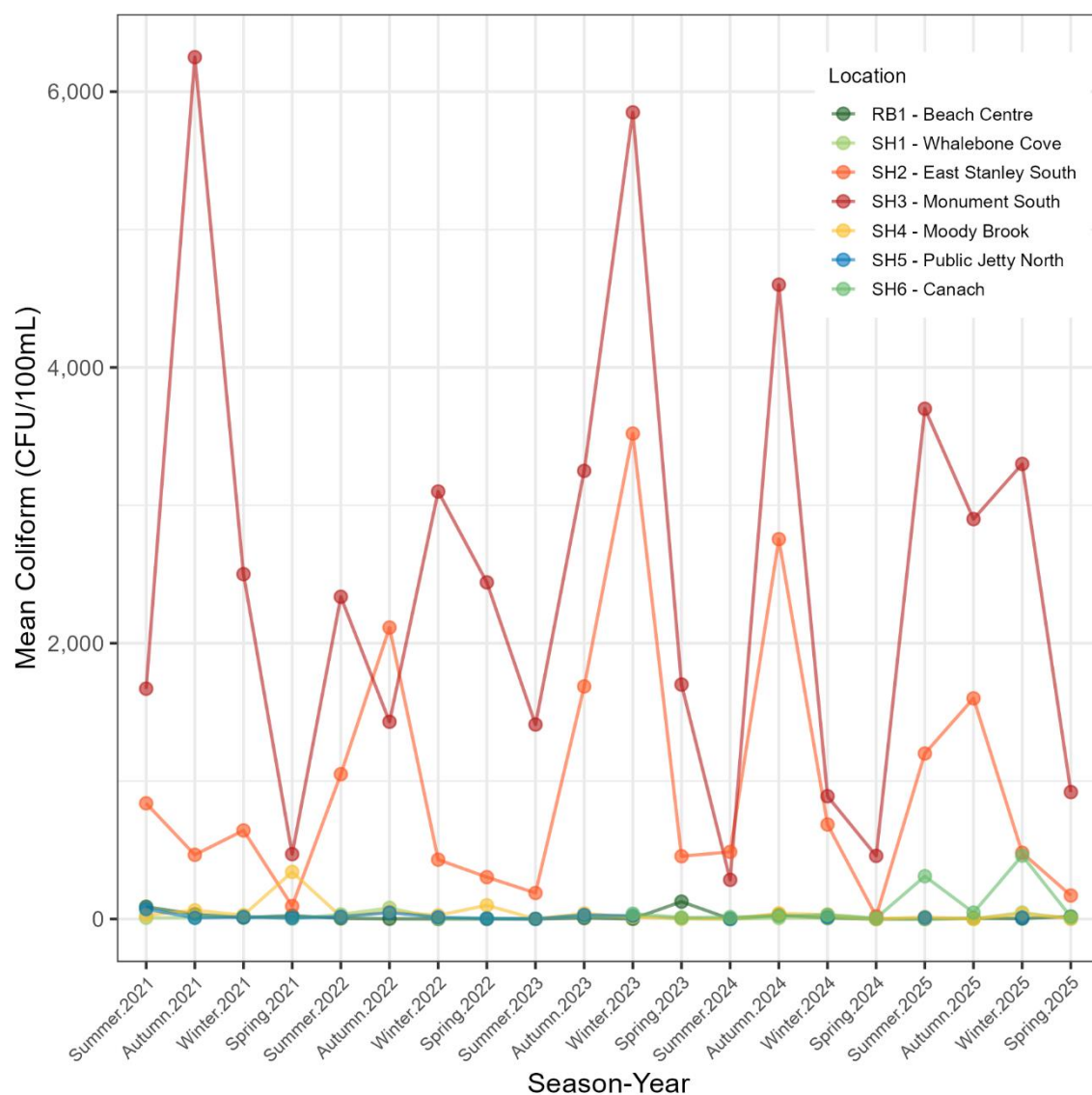


Figure 3. Temporal trends in Coliform concentrations by location in Stanley, Falkland Islands (2021-2025). Seven monitoring sites are color-coded. Data represent seasonal means.

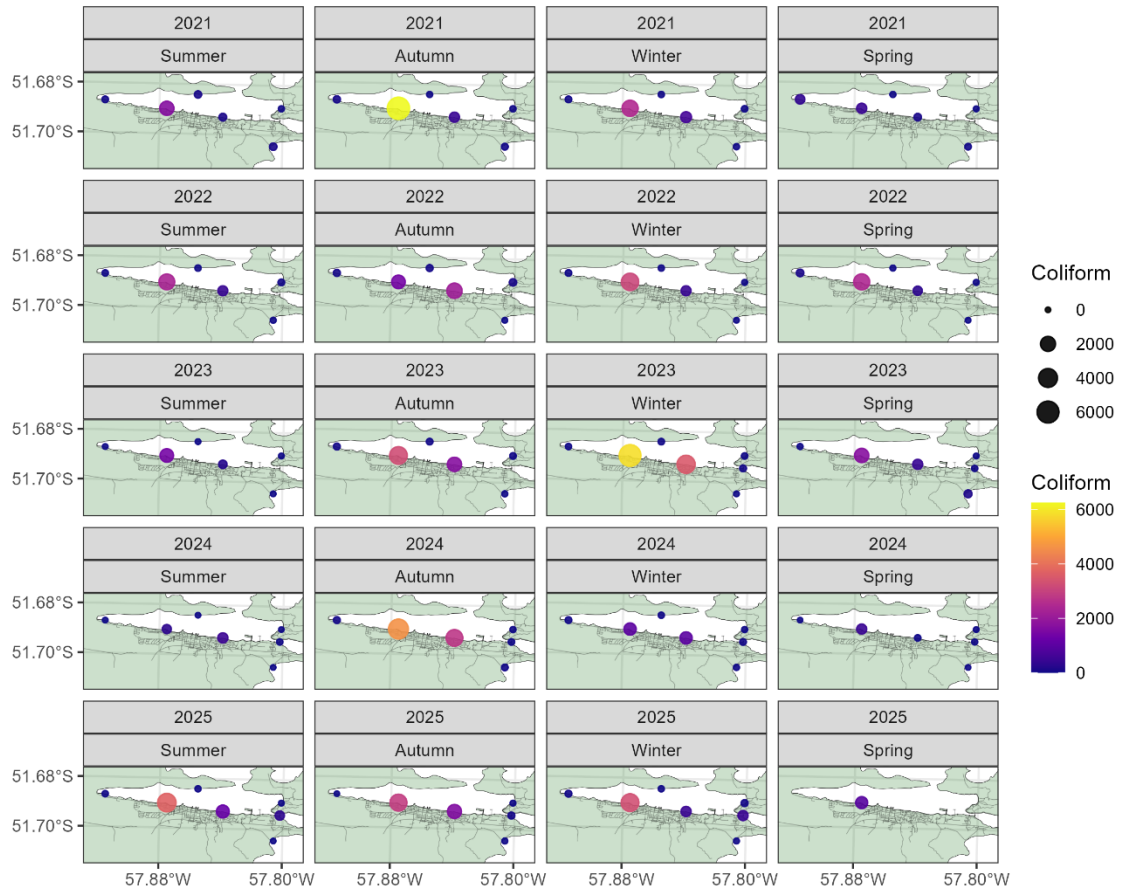


Figure 4. Spatial and seasonal distribution of mean Coliform concentrations (CFU/100 mL) at coastal sampling sites around Stanley between 2021 and 2025. Each panel represents a combination of year (rows) and season (columns). Point colour and size indicates Coliform concentration.

3.2.2 *Escherichia coli*

E. coli monitoring in 2025 showed strong spatial differences across Stanley’s coastal sites. Beach Centre (RB1) maintained near-zero levels, while Monument South (SH3) remained the most contaminated site, with extremely high concentrations throughout the year. East Stanley South (SH2) showed moderate but highly variable contamination, peaking in autumn. Whalebone Cove (SH1), Moody Brook (SH4), and Public Jetty North (SH5) generally recorded low levels, and Canache (SH6) showed mostly low concentrations except for a winter peak (Table 4).

Escherichia coli trends from the 2021–2024 baseline to 2025 show that Monument North (SH2) and Monument South (SH3) remain the most concerning sites, with persistently high contamination and large seasonal fluctuations. Other locations showed mixed but generally less severe patterns: Beach Centre (RB1) and Public Jetty North (SH5) continued to improve, while Canache (SH6) deteriorated sharply, and Moody Brook (SH4) displayed extreme seasonal variability (Table 4; Figure 5; Figure 6).

Table 4. Seasonal percentage changes in *Escherichia coli* concentrations comparing 2025 values to 2021-2024 baseline averages across seven monitoring locations in Stanley, Falkland Islands. Baseline values represent four-year seasonal means (CFU/100 mL), 2025 values represent single-year seasonal measurements, and percentage changes are calculated as $[(2025 - \text{baseline}) / \text{baseline}] \times 100$.

Location	Season	Escherichia coli		
		2021-2024	2025	Change (%)
RB1	Summer	7.0	0.0	-100%
RB1	Autumn	7.4	0.0	-100%
RB1	Winter	0.7	0.0	-100%
RB1	Spring	7.0	4.0	-43%
SH1	Summer	1.9	1.0	-48%
SH1	Autumn	22.3	1.0	-96%
SH1	Winter	6.3	8.0	27%
SH1	Spring	0.3		
SH2	Summer	142.7	92.0	-36%
SH2	Autumn	532.8	540.0	1%
SH2	Winter	813.8	270.0	-67%
SH2	Spring	41.2	50.0	21%
SH3	Summer	362.0	840.0	132%
SH3	Autumn	1,560.1	970.0	-38%
SH3	Winter	2,688.3	2,000.0	-26%
SH3	Spring	267.2	560.0	110%
SH4	Summer	4.0	15.0	279%
SH4	Autumn	21.9	0.0	-100%
SH4	Winter	13.9	15.0	8%
SH4	Spring	3.2	2.0	-39%
SH5	Summer	10.0	9.0	-10%
SH5	Autumn	10.1		
SH5	Winter	10.6	2.0	-81%
SH5	Spring	0.7		
SH6	Summer	4.0	44.0	1000%
SH6	Autumn	5.3	2.0	-63%
SH6	Winter	19.8	130.0	558%
SH6	Spring	2.0	7.0	250%

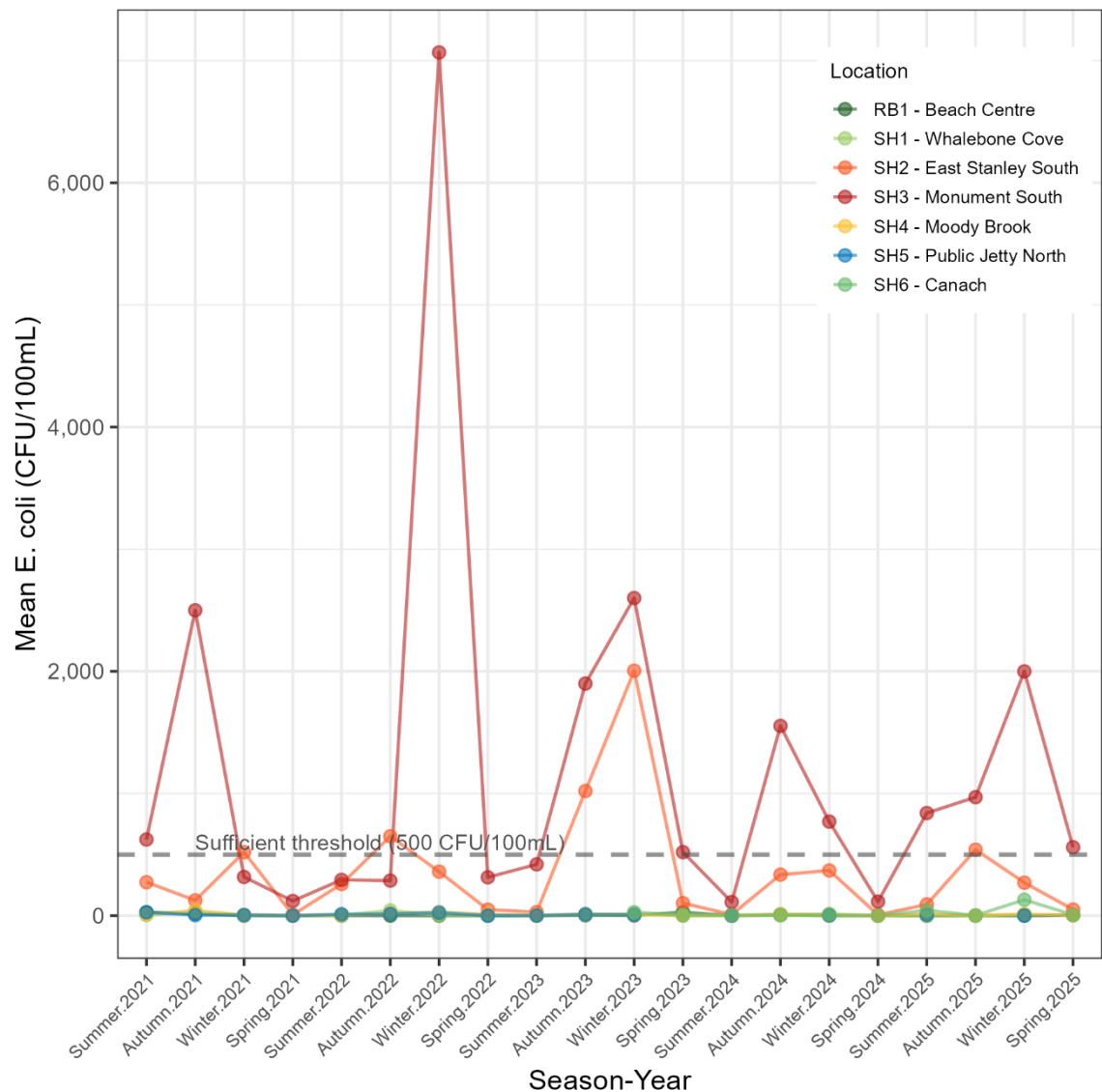


Figure 5. Temporal trends in *Escherichia coli* concentrations by location in Stanley, Falkland Islands (2021-2025). Seven monitoring sites are color-coded from red (poor quality) to green/blue (excellent quality). Grey dashed line represents WHO "Sufficient" threshold of 500 CFU/100 mL. Data represent seasonal means.

In 2025, *E. coli* compliance with WHO (2018) water quality standards (<500 CFU/100 mL for "Sufficient" classification) revealed critical water quality failures at Monument South alongside excellent performance at most other monitoring sites (Figure 7). Five sites achieved perfect 100% compliance across all monitored seasons: Beach Centre (RB1), Whalebone Cove (SH1), Moody Brook (SH4), Public Jetty North (SH5), and Canache (SH6) all maintained *E. coli* concentrations consistently below safety thresholds throughout summer, autumn, winter, and spring. Notably, Canache (SH6) demonstrated complete compliance in 2025 despite showing dramatic increases in absolute *E. coli* concentrations, indicating that while levels rose substantially from baseline, they remained below the 500 CFU/100 mL threshold. East Stanley South (SH2) showed highly variable seasonal compliance with 100% compliance in summer, winter, and spring, but complete failure in autumn (0% compliance), suggesting episodic

contamination events at this location in 2025. Most alarmingly, Monument South (SH3) experienced non-compliance with 0% of samples meeting standards across all four seasons in 2025, representing complete and persistent failure throughout the entire year and confirming this site as critically unsafe for any recreational water contact.

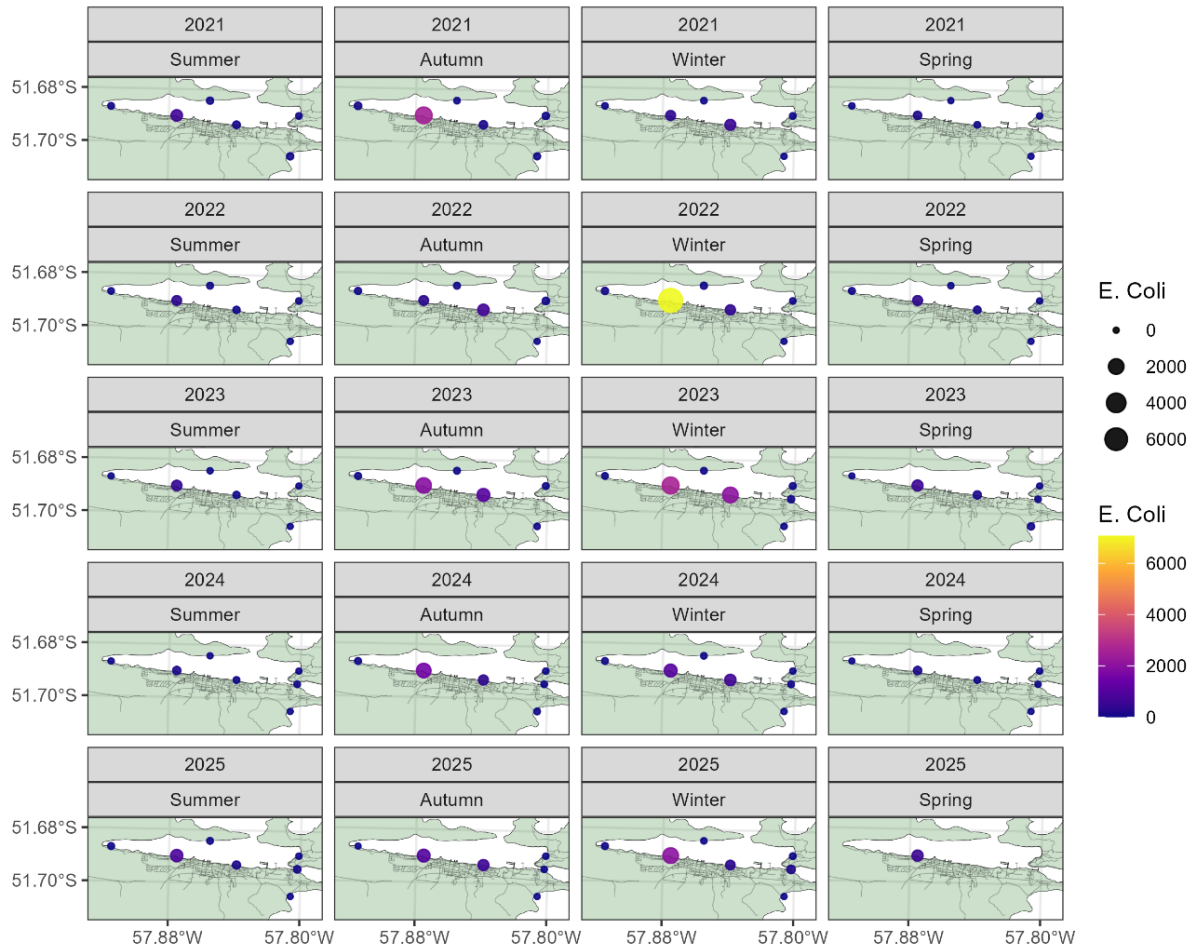


Figure 6. Mean *Escherichia coli* concentrations (CFU/100 mL) by year and season at coastal sampling locations in Stanley from 2021 to 2025. Colours and point size reflect magnitude of *E. coli* concentrations.

E. coli compliance in 2025 showed strong performance at most sites but a severe decline at Monument South (SH3). Beach Centre (RB1), Whalebone Cove (SH1), Moody Brook (SH4), Public Jetty North (SH5), and Canache (SH6) all maintained 100% compliance, continuing their excellent records from previous years. East Stanley South (SH2) improved overall in 2025, though an autumn failure reflects ongoing seasonal issues. In contrast, Monument South (SH3) experienced a complete collapse, with 0% compliance across all four seasons the worst annual performance recorded at any site in the monitoring programme.



Figure 7. Annual and seasonal compliance rates with WHO (2018) *Escherichia coli* water quality standards across seven monitoring locations in Stanley, Falkland Islands (2021-2025). Values represent the percentage of samples with *E. coli* concentrations below 500 CFU/100mL (minimum "Sufficient" threshold). Gray cells indicate no data collected.

3.2.3 Enterococci

Enterococci levels in 2025 showed clear differences among sites. Beach Centre (RB1) recorded 0 CFU/100 mL in all seasons, and Whalebone Cove (SH1), Moody Brook (SH4), and Public Jetty North (SH5) all maintained very low concentrations. In contrast, Monument South (SH3) showed persistently high contamination, with values peaking in autumn. East Stanley South (SH2) recorded moderate but stable levels, while Canache (SH6) showed concerning increases in winter despite generally low concentrations. (Table 5).

Table 5. Seasonal percentage changes in Enterococci concentrations comparing 2025 values to 2021-2024 baseline averages across seven monitoring locations in Stanley, Falkland Islands. Baseline values represent four-year seasonal means (CFU/100 mL), 2025 values represent single-year seasonal measurements, and percentage changes are calculated as $[(2025 - \text{baseline}) / \text{baseline}] \times 100$.

Location	Season	Enterococci		
		2021-2024	2025	Change (%)
RB1	Summer	0.5	0.0	-100%
RB1	Autumn	10.9	0.0	-100%
RB1	Winter	1.0	0.0	-100%
RB1	Spring	2.0		
SH1	Summer	2.4	1.0	-59%
SH1	Autumn	17.3	0.0	-100%
SH1	Winter	3.1	5.0	60%
SH1	Spring	0.2		
SH2	Summer	14.8	46.0	212%
SH2	Autumn	261.5	37.0	-86%
SH2	Winter	117.1	44.0	-62%
SH2	Spring	13.1		
SH3	Summer	74.3	68.0	-9%
SH3	Autumn	242.0	520.0	115%
SH3	Winter	175.9	310.0	76%
SH3	Spring	55.1	23.0	-58%
SH4	Summer	4.2	6.0	44%
SH4	Autumn	15.7	0.0	-100%
SH4	Winter	6.6	1.0	-85%
SH4	Spring	2.3		
SH5	Summer	2.0	5.0	150%
SH5	Autumn	13.1		
SH5	Winter	6.5	0.0	-100%
SH5	Spring	2.5		
SH6	Summer	1.5	12.0	700%
SH6	Autumn	1.7	0.0	-100%
SH6	Winter	5.0	41.0	720%
SH6	Spring	2.2		

Enterococci results in 2025 showed that East Stanley South (SH2) and Monument South (SH3) remain the most concerning sites, with large seasonal fluctuations and consistently elevated contamination compared with the 2021–2024 baseline. Other locations showed mixed but generally less severe trends: Beach Centre (RB1), Whalebone Cove (SH1), and Moody Brook (SH4) achieved complete elimination in autumn, while Public Jetty North (SH5) also showed strong improvements. In contrast, Canache (SH6) deteriorated sharply, with *Enterococci* increasing by more than 700% in both summer and winter. (Table 5; Figure 8; Figure 9).

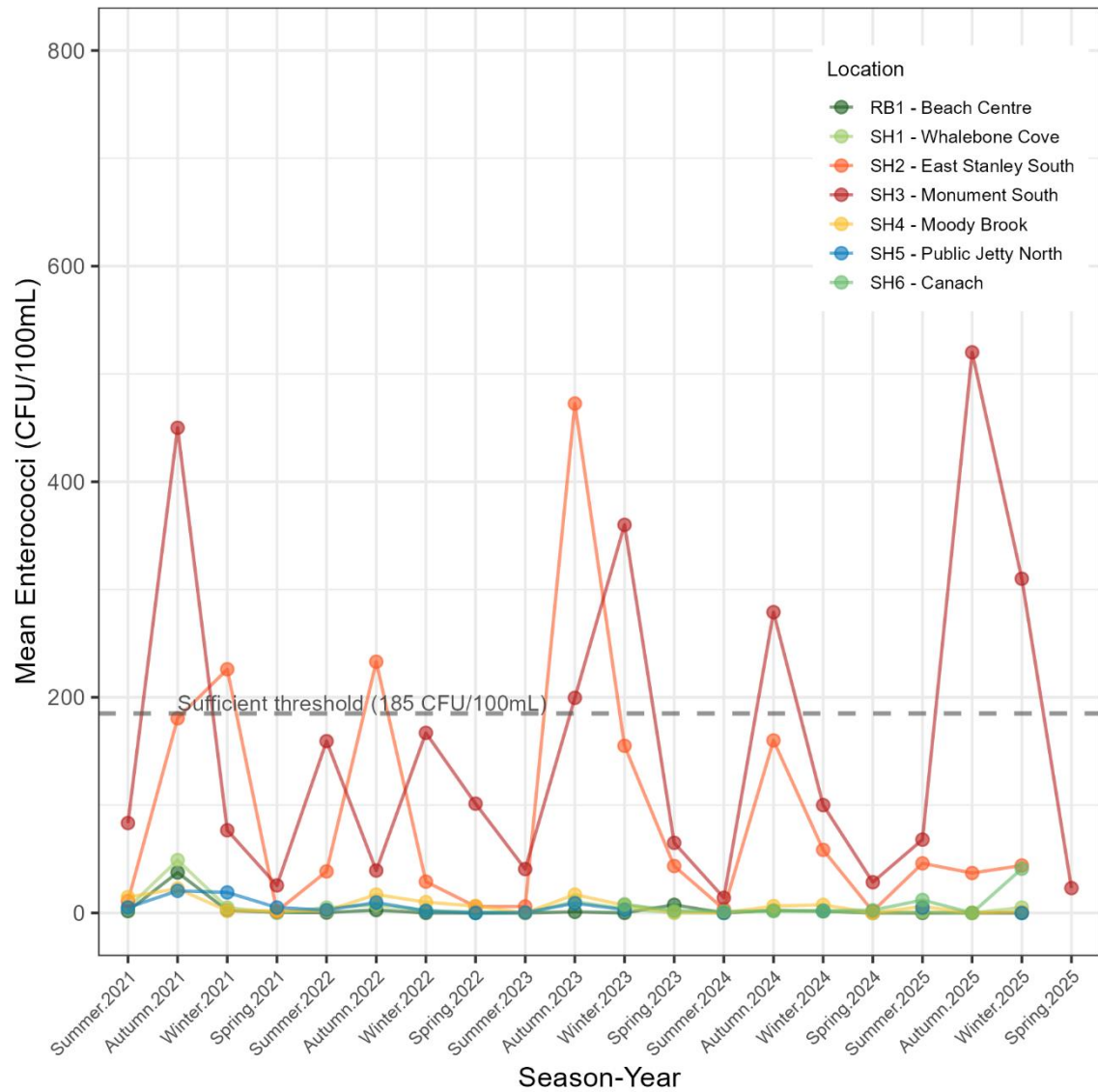


Figure 8. Temporal trends in mean Enterococci concentrations by season and location in Stanley, Falkland Islands (2021-2025). Seven monitoring sites are color-coded from red (poor quality) to green/blue (excellent quality). Grey dashed line represents WHO "Sufficient" threshold of 185 CFU/100mL. Data represent seasonal means.

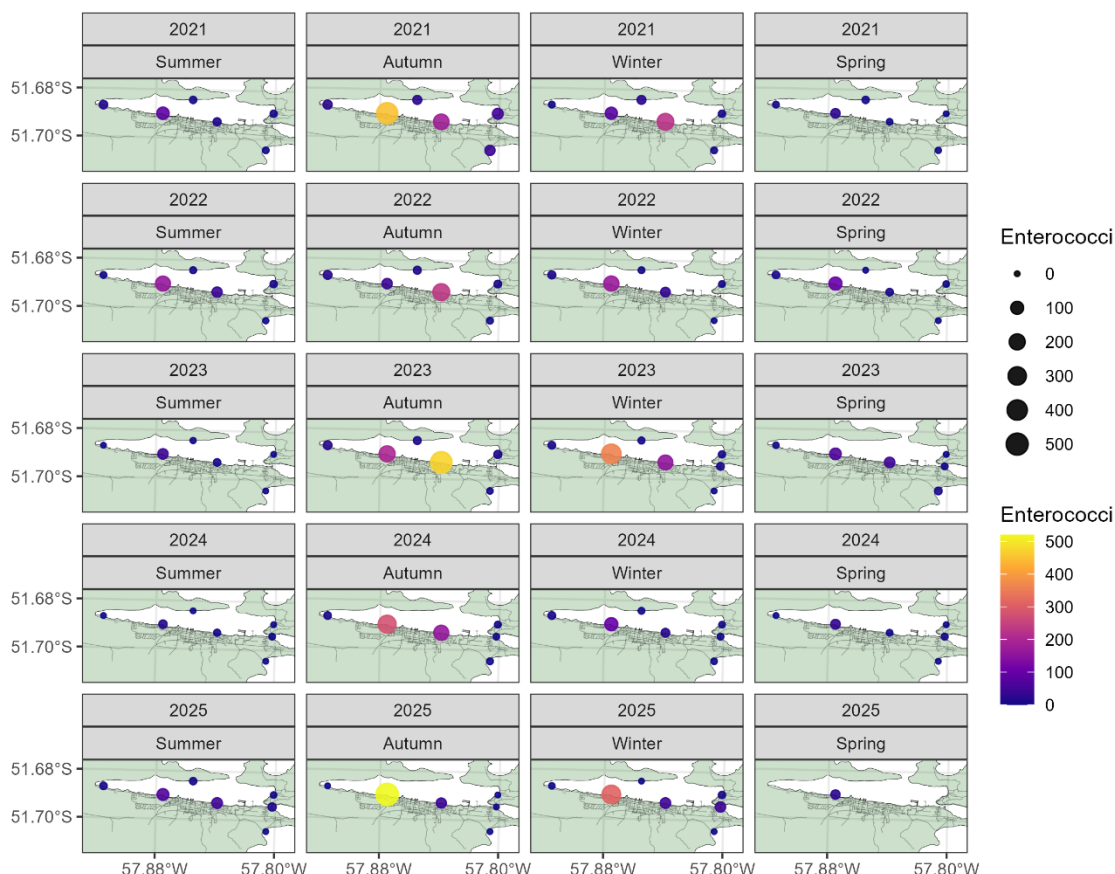


Figure 9. Mean Enterococci concentrations (CFU/100 mL) across six sampling sites in Stanley from 2021 to 2025, displayed by season and year. Warmer colours and larger point sizes denote higher Enterococci levels.

In 2025, Enterococci compliance with WHO (2018) standards (<185 CFU/100 mL) showed a clear divide between sites. Six locations RB1, SH1, SH2, SH4, SH5, and SH6 achieved 100% compliance across all monitored seasons. In contrast, Monument South (SH3) failed completely in autumn and winter, making it the only site with repeated non-compliance despite meeting standards in summer and spring.

The 2025 Enterococci concentration pattern represents both improvements and deteriorations compared to the 2021–2024 baseline period (Figure 10). Beach Centre (RB1), Whalebone Cove (SH1), Moody Brook (SH4), and Public Jetty North (SH5) maintained their perfect compliance records from 2021–2025, confirming them as consistently safe reference sites. Canache (SH6) also continued its strong performance with 100% compliance across all recent monitoring periods. East Stanley South (SH2) showed marked improvement in 2025, achieving full compliance after several years of variable results. In contrast, Monument South (SH3) deteriorated sharply, with complete compliance failures in autumn and winter 2025. This decline makes SH3 the most critical water-quality concern in Stanley Harbour and highlights the need for urgent investigation and management action. (Figure 10).

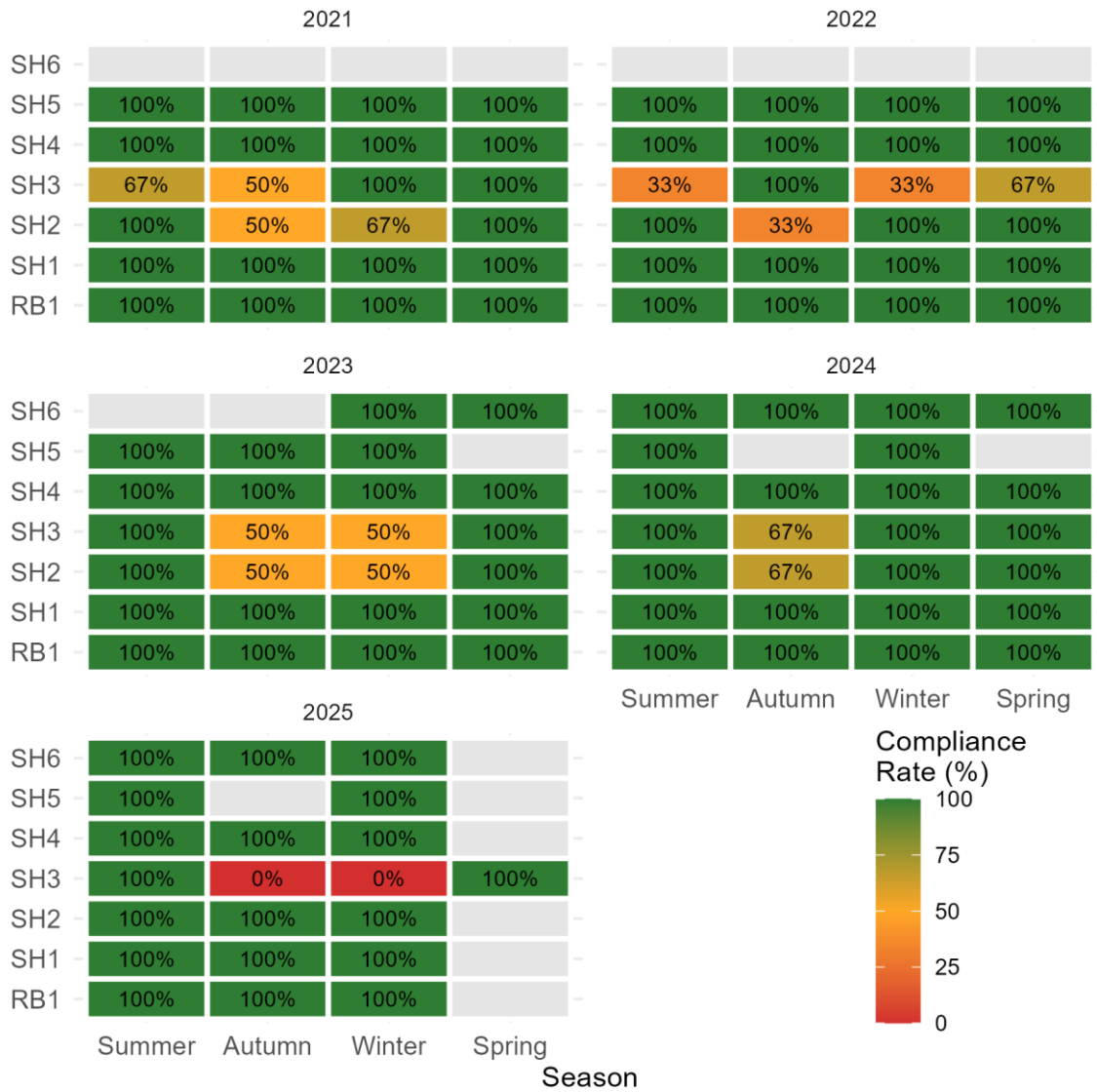


Figure 10. Annual and seasonal compliance rates with WHO (2018) Enterococci water quality standards across seven monitoring locations in Stanley, Falkland Islands (2021-2025). Values represent the percentage of samples with Enterococci concentrations below 185 CFU/100mL (minimum "Sufficient" threshold). Gray cells indicate no data collected.

4 Discussion

The results from 2021–2025 reveal a consistent and spatially structured pattern of microbial contamination within Stanley Harbour, with the central sites (SH2 and SH3) repeatedly exhibiting the highest concentrations of faecal indicator bacteria. This persistent hotspot pattern suggests the influence of localised contamination sources situated near or upstream of these central monitoring points. The long-term stability of this pattern confirms that contamination at SH2 and SH3 is persistent. Given that this area is one of the most populated and heavily used zones of Stanley, continuous inputs from wastewater, urban runoff, and harbour operations are the most plausible drivers. This increases the likelihood of sustained anthropogenic pressure on the central harbour.

In contrast, the western sites (RB1, SH1, SH5) consistently maintained low microbial concentrations, regardless of season or year. Because samples were taken under different tide and weather conditions, this may reflect differences in hydrodynamics, circulation patterns, or proximity to anthropogenic inputs. The western sector of the harbour may benefit from better water exchange with open coastal waters, reduced human activity, or greater distance from potential contamination sources. These findings highlight the importance of local circulation and site-specific pressures in shaping microbial water quality.

Seasonal variability was also evident, with autumn and winter showing the highest microbial loads at the central sites. Lower temperatures may also reduce microbial die-off rates, allowing indicator bacteria to persist longer in the water column (Bai & Lung, 2005). Additionally, seasonal changes in water circulation or reduced sunlight may further contribute to the persistence of faecal indicators during these periods. The recurrence of winter and autumn peaks across multiple years supports the role of seasonal environmental drivers.

The magnitude of contamination observed at SH2 and SH3, particularly the extreme values recorded for Coliforms and *E. coli*, raises concerns regarding potential public health risks. Although Enterococci levels were generally lower, their spatial and seasonal patterns mirrored those of the other indicators, reinforcing the conclusion that faecal contamination is concentrated in the central harbour.

Overall, the combined spatial and temporal patterns point to a system where contamination is both localised and seasonally intensified. Continued monitoring, would further enhance understanding of contamination pathways.

5 Conclusion

The results highlight that on the central harbour area, SH2 and SH3 are consistently showing the highest microbial loads. Identifying and mitigating the specific sources contributing to contamination at these sites will be essential for improving water quality and reducing potential public health risks. This concern is reinforced by the high counts of *E. coli*, Coliforms, and Intestinal Enterococci recorded at SH2 and SH3 sites throughout 2025. Although some months fall below the threshold, it remains recommended that the public avoid swimming in or ingesting water from Stanley Harbour between the Beaver Hanger in West Stanley and FIPASS until further notice. Continued long-term monitoring, will be crucial for understanding contamination pathways and guiding effective environmental management. In the meantime, the FIG Environment Department will maintain regular monitoring of pollution levels to safeguard both ecological integrity and public health.

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7 Appendices

Table 6. Temporal variation in fecal indicator bacteria concentrations (CFU/100mL) at seven monitoring locations in Stanley, Falkland Islands (2021-2025). Values represent mean $\pm$ standard deviation. RB1: Beach Centre; SH1: Whalebone Cove; SH2: East Stanley South; SH3: Monument South; SH4: Moody Brook; SH5: Public Jetty North; SH6: Canach. Empty cells indicate no data collected. CFU = Colony Forming Units.

Year	Season	Parameter	RB1	SH1	SH2	SH3	SH4	SH5	SH6
2021	Autumn	Coliform	34.5 $\pm$ 47.4	10.5 $\pm$ 3.5	465.0 $\pm$ 134.4	6250.0 $\pm$ 1767.8	63.0 $\pm$ 66.5	8.0 $\pm$ 5.7	
2021	Spring	Coliform	24.0 $\pm$ 33.9	1.5 $\pm$ 2.1	93.5 $\pm$ 51.6	470.0 $\pm$ 183.8	341.0 $\pm$ 479.4	7.5 $\pm$ 0.7	
2021	Summer	Coliform	88.3 $\pm$ 148.7	8.7 $\pm$ 5.9	838.7 $\pm$ 1265.6	1670.0 $\pm$ 1396.3	27.3 $\pm$ 15.9	71.7 $\pm$ 77.9	
2021	Winter	Coliform	9.7 $\pm$ 5.0	19.7 $\pm$ 29.0	642.0 $\pm$ 766.2	2500.7 $\pm$ 2290.2	27.3 $\pm$ 43.1	14.0 $\pm$ 23.4	
2022	Autumn	Coliform	1.3 $\pm$ 1.5	80.3 $\pm$ 62.8	2113.3 $\pm$ 1206.0	1430.0 $\pm$ 1533.5	54.7 $\pm$ 31.1	45.7 $\pm$ 14.6	
2022	Spring	Coliform	0.3 $\pm$ 0.6	3.7 $\pm$ 6.4	303.3 $\pm$ 195.0	2441.3 $\pm$ 3531.1	99.0 $\pm$ 165.4	3.7 $\pm$ 5.5	
2022	Summer	Coliform	4.3 $\pm$ 6.7	32.7 $\pm$ 40.3	1050.0 $\pm$ 1098.2	2336.7 $\pm$ 1589.0	17.3 $\pm$ 19.9	16.3 $\pm$ 22.3	
2022	Winter	Coliform	0.3 $\pm$ 0.6	3.7 $\pm$ 5.5	430.0 $\pm$ 514.5	3100.0 $\pm$ 2762.2	26.0 $\pm$ 26.0	12.3 $\pm$ 12.0	
2023	Autumn	Coliform	6.5 $\pm$ 9.2	26.5 $\pm$ 23.3	1686.5 $\pm$ 2281.8	3250.0 $\pm$ 2333.5	40.0 $\pm$ 24.0	28.0 $\pm$ 18.4	
2023	Spring	Coliform	125.5 $\pm$ 176.1	1.0 $\pm$ 1.4	455.0 $\pm$ 190.9	1700.0 $\pm$ 989.9	5.0 $\pm$ 1.4		10.0 $\pm$ 2.8
2023	Summer	Coliform	0.5 $\pm$ 0.7	1.3 $\pm$ 1.2	188.3 $\pm$ 134.2	1410.0 $\pm$ 612.6	0.3 $\pm$ 0.6	0.7 $\pm$ 1.2	
2023	Winter	Coliform	1.0 $\pm$ 1.4	17.5 $\pm$ 23.3	3520.0 $\pm$ 4214.4	5850.0 $\pm$ 1626.3	14.0 $\pm$ 1.4	23	38
2024	Autumn	Coliform	29.0 $\pm$ 47.6	7.0 $\pm$ 6.0	2754.3 $\pm$ 3007.1	4600.0 $\pm$ 3200.0	40.7 $\pm$ 34.0		19.3 $\pm$ 15.5
2024	Spring	Coliform	0.0 $\pm$ 0.0	0.5 $\pm$ 0.7	19.5 $\pm$ 19.1	457.5 $\pm$ 639.9	0.0 $\pm$ 0.0		6.0 $\pm$ 5.7
2024	Summer	Coliform	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	486.5 $\pm$ 655.5	283.5 $\pm$ 306.2	0.5 $\pm$ 0.7	0	13.5 $\pm$ 16.3
2024	Winter	Coliform	7.5 $\pm$ 7.8	6.5 $\pm$ 0.7	685.0 $\pm$ 431.3	890.0 $\pm$ 155.6	30.5 $\pm$ 37.5	13	30.0 $\pm$ 21.2
2025	Autumn	Coliform	5	2	1600	2900	0		46
2025	Spring	Coliform	17	1	170	920	6		15
2025	Summer	Coliform	0	1	1200	3700	15	10	310
2025	Winter	Coliform	3	46	480	3300	37	10	460
2021	Autumn	<i>E. coli</i>	18.0 $\pm$ 24.0	32.0 $\pm$ 43.8	125.0 $\pm$ 91.9	2500.0 $\pm$ 989.9	43.0 $\pm$ 53.7	4.5 $\pm$ 6.4	
2021	Spring	<i>E. coli</i>	0.0 $\pm$ 0.0	0.5 $\pm$ 0.7	7.5 $\pm$ 7.8	120.0 $\pm$ 0.0	2.0 $\pm$ 2.8	0.0 $\pm$ 0.0	
2021	Summer	<i>E. coli</i>	27.0 $\pm$ 45.0	4.3 $\pm$ 5.1	274.0 $\pm$ 380.0	623.3 $\pm$ 695.0	10.0 $\pm$ 7.0	27.7 $\pm$ 23.9	

Year	Season	Parameter	RB1	SH1	SH2	SH3	SH4	SH5	SH6
2021	Winter	<i>E. coli</i>	0.3 ± 0.6	7.3 ± 11.8	519.7 ± 849.0	316.7 ± 275.4	4.3 ± 4.5	5.0 ± 8.7	
2022	Autumn	<i>E. coli</i>	0.0 ± 0.0	43.3 ± 49.3	650.0 ± 826.1	287.0 ± 179.5	18.7 ± 18.5	14.7 ± 10.0	
2022	Spring	<i>E. coli</i>	0.0 ± 0.0	0.3 ± 0.6	49.0 ± 32.5	314.0 ± 353.1	11.0 ± 19.1	1.3 ± 2.3	
2022	Summer	<i>E. coli</i>	1.0 ± 1.7	3.3 ± 2.5	259.0 ± 390.6	293.0 ± 177.3	5.0 ± 6.1	11.7 ± 20.2	
2022	Winter	<i>E. coli</i>	0.0 ± 0.0	3.3 ± 2.5	360.0 ± 296.1	7066.7 ± 7752.6	30.7 ± 18.7	24.3 ± 30.0	
2023	Autumn	<i>E. coli</i>	3.5 ± 4.9	12.0 ± 9.9	1020.5 ± 1385.2	1900.0 ± 848.5	12.5 ± 12.0	11.0 ± 2.8	
2023	Spring	<i>E. coli</i>	28.0 ± 38.2	0.0 ± 0.0	102.5 ± 38.9	520.0 ± 537.4	0.0 ± 0.0		3.5 ± 2.1
2023	Summer	<i>E. coli</i>	0.0 ± 0.0	0.0 ± 0.0	29.3 ± 11.9	420.0 ± 199.7	0.3 ± 0.6	0.7 ± 1.2	
2023	Winter	<i>E. coli</i>	2.0 ± 0.0	13.5 ± 17.7	2005.5 ± 2820.6	2600.0 ± 989.9	9.0 ± 5.7	8	28
2024	Autumn	<i>E. coli</i>	8.0 ± 13.9	2.0 ± 2.0	335.7 ± 311.5	1553.3 ± 1169.0	13.3 ± 18.8		5.3 ± 5.0
2024	Spring	<i>E. coli</i>	0.0 ± 0.0	0.5 ± 0.7	6.0 ± 7.1	115.0 ± 162.6	0.0 ± 0.0		0.5 ± 0.7
2024	Summer	<i>E. coli</i>	0.0 ± 0.0	0.0 ± 0.0	8.5 ± 7.8	111.5 ± 125.2	0.5 ± 0.7	0	4.0 ± 4.2
2024	Winter	<i>E. coli</i>	0.5 ± 0.7	1.0 ± 1.4	370.0 ± 353.6	770.0 ± 325.3	11.5 ± 16.3	5	11.5 ± 7.8
2025	Autumn	<i>E. coli</i>	0	1	540	970	0		2
2025	Spring	<i>E. coli</i>	4		50	560	2		7
2025	Summer	<i>E. coli</i>	0	1	92	840	15	9	44
2025	Winter	<i>E. coli</i>	0	8	270	2000	15	2	130
2021	Autumn	Enterococci	37.5 ± 53.0	49.0 ± 69.3	180.5 ± 239.7	450.0 ± 495.0	22.5 ± 29.0	20.5 ± 29.0	
2021	Spring	Enterococci	0.5 ± 0.7	0.0 ± 0.0	1.5 ± 2.1	25.5 ± 3.5	2.0 ± 1.4	5.0 ± 7.1	
2021	Summer	Enterococci	1.7 ± 2.9	4.7 ± 7.2	11.0 ± 4.2	83.3 ± 127.3	14.7 ± 23.7	5.0 ± 7.8	
2021	Winter	Enterococci	2.3 ± 2.5	5.0 ± 8.7	226.0 ± 358.9	76.7 ± 68.1	2.0 ± 2.0	19.0 ± 29.5	
2022	Autumn	Enterococci	2.7 ± 4.6	7.3 ± 5.5	233.0 ± 204.6	39.3 ± 19.0	17.0 ± 11.5	9.7 ± 5.0	
2022	Spring	Enterococci	0.0 ± 0.0	1.0 ± 1.7	6.0 ± 5.3	101.3 ± 146.9	6.3 ± 10.1	0.0 ± 0.0	
2022	Summer	Enterococci	0.3 ± 0.6	5.0 ± 7.0	38.5 ± 17.7	159.3 ± 105.6	2.0 ± 2.6	2.7 ± 2.9	
2022	Winter	Enterococci	0.0 ± 0.0	2.0 ± 3.5	29.0 ± 20.0	167.0 ± 83.3	10.0 ± 8.5	2.0 ± 1.0	
2023	Autumn	Enterococci	1.0 ± 1.4	10.5 ± 13.4	472.5 ± 647.0	199.5 ± 212.8	17.0 ± 24.0	9.0 ± 1.4	
2023	Spring	Enterococci	7.5 ± 10.6	0.0 ± 0.0	43.5 ± 6.4	65.0 ± 42.4	1.0 ± 1.4		2.0 ± 1.4
2023	Summer	Enterococci	0.0 ± 0.0	0.0 ± 0.0	6.0 ± 3.0	40.7 ± 23.0	0.0 ± 0.0	0.3 ± 0.6	
2023	Winter	Enterococci	0.0 ± 0.0	4.0 ± 5.7	155.0 ± 49.5	360.0 ± 282.8	7.0 ± 9.9	3	8

Year	Season	Parameter	RB1	SH1	SH2	SH3	SH4	SH5	SH6
2024	Autumn	Enterococci	2.3 ± 4.0	2.3 ± 3.2	160.0 ± 234.8	279.0 ± 383.0	6.3 ± 10.1		1.7 ± 1.5
2024	Spring	Enterococci	0.0 ± 0.0	0.0 ± 0.0	1.5 ± 2.1	28.5 ± 36.1	0.0 ± 0.0		2.5 ± 2.1
2024	Summer	Enterococci	0.0 ± 0.0	0.0 ± 0.0	3.5 ± 3.5	14.0 ± 0.0	0.0 ± 0.0	0	1.5 ± 2.1
2024	Winter	Enterococci	1.5 ± 2.1	1.5 ± 0.7	58.5 ± 58.7	100.0 ± 0.0	7.5 ± 9.2	2	2.0 ± 0.0
2025	Autumn	Enterococci	0	0	37	520	0		0
2025	Spring	Enterococci				23			
2025	Summer	Enterococci	0	1	46	68	6	5	12
2025	Winter	Enterococci	0	5	44	310	1	0	41