Centre for Environment Fisheries & Aquaculture Science

Cefas

The Shellfish official control monitoring programmes for Scotland

Summary report for 2022

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Date: March 2023

This publication is available at www.gov.uk/government/publications

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Cefas Document Control

Submitted to:	Graham Ewen, Food Standards Scotland (FSS)
Date submitted:	24/03/2023
Project Manager:	Karen Litster
Report compiled by:	Lewis Coates, Sarah Swan, Lesley Bickerstaff, Charlotte King, Tina Jones and Sean Panton
Quality control by:	T. Jones & K. Litster, 16/02/2023 M. Algoet, 01/03/2023 M. Price-Hayward, 13/02/2023
Approved by and date:	M. Algoet, 14/03/2023
Version:	FINAL
Classification:	Official
Recommended citation for this report:	Coates L., Swan. S, Bickerstaff L., King C. and Panton S. (2022). The Shellfish official control monitoring programmes for Scotland. Summary report for 2022. Cefas Project Report for FSS (Contract C7711/C7712/C7713/C7714/C7715), 38 pp.

Version control history

Version	Author	Date	Comment
Draft V0.1	L. Coates, S. Swan, L. Bickerstaff, C. King, S. Panton	08/02/2023	Draft for QC
Draft V0.2	T Jones	16/02/2023	QC checks
Draft V0.2	K Litster	16/02/2023	QC checks minor edits
Draft V0.3	L. Coates	27/02/2023	Draft for Internal approval
Draft V0.4	M. Algoet	14/03/2023	Final review prior to submission to FSS
Draft V0.4	K. Litster	14/03/2023	Draft V0.4 submitted to FSS
Final V1	K. Litster	24/03/2023	Final approved by FSS

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Contents

Glossary

ASP	Amnesic Shellfish Poisoning
AZA	Azaspiracid
DA	Domoic Acid
DSP	Diarrhetic Shellfish Poisoning
DTX	Dinophysistoxin
dcSTX	decarbamoyl saxitoxin
EC	European Commission
EU	European Union
Fera	Fera Science Limited
FSS	Food Standards Scotland
GTX	Gonyautoxin
HPLC	High Performance Liquid Chromatography
LA	Local Authority
LC-MS/MS	Liquid Chromatography with tandem Mass Spectrometry
LOD	Limit of detection
LOQ	Limit of quantitation
LT(s)	Lipophilic Toxin(s)
MPL	Maximum Permitted Level
ND	Not Detected
NEO	Neosaxitoxin
OA	Okadaic Acid
PAHs	Polycyclic aromatic hydrocarbons
PCB	Ortho-substituted PCB (non planar)
PCDD/F (dioxins)	Polychlorinated dibenzo-*p*-dioxin/ polychlorinated dibenzofuran
PSP	Paralytic Shellfish Poisoning
PTX	Pectenotoxin
PTX2	Pectenotoxin 2
PTX2sa	Pectenotoxin 2 seco-acid
RL	Reporting limit
RMP	Representative Monitoring Point
SAMS	Scottish Association for Marine Science
SSQC	SSQC Ltd
STX	Saxitoxin
YTX	Yessotoxin

1. Introduction

This report describes the results of the Scottish Official Control Monitoring Programmes delivered by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and partners for the period 1st January to 31st December 2022.

The programmes were delivered on behalf of Food Standards Scotland (FSS), the national competent authority for food safety and were aimed at delivering the testing required for the statutory monitoring of biotoxins, *E.coli* and chemical contaminants in shellfish and for the identification and enumeration of potentially harmful algal species in selected shellfish harvesting areas, as described in retained European Union (EU) regulations 2017/625 and 2074/2005.

The co-ordination of the programme, its logistics, toxin analyses and the majority of *E. coli* analyses were conducted by Cefas, whilst phytoplankton analyses were performed by the Scottish Association for Marine Science (SAMS) in Oban, chemical contaminants analyses by Fera Science Ltd (Fera) in York and *E. coli* analyses for Shetland and Orkney (Westray) only by SSQC Ltd in Scalloway. These laboratories were contracted by Cefas under the scope of the 'Shellfish Partnership'.

A summary of these programmes and their results are presented in the following sections of this report:

- Section 1: Toxin and phytoplankton monitoring programme
- Section 2: *E. coli* monitoring programme
- Section 3: Chemical contaminants monitoring programme

A total of 4,414 shellfish samples and 1,354 water samples were collected from shellfish classified production areas for the purpose of the 2022 Scottish official control monitoring programmes. Since the 1st of April 2018, sampling officers from HMMH (Scotland) Ltd (HMMH) have collected or arranged collection for all samples from all geographic locations, under a contract arrangement with Cefas. For the purpose of this report and in line with FSS protocol, a 'verified' shellfish sample is defined as a sample collected from the agreed monitoring point by an authorised sampling officer. Samples 'verified from shore' are defined as samples collected by harvesters under the supervision of the authorised sampling officer. Such arrangements are implemented when sampling officers are unable to accompany the harvester to the location of the monitoring point at the time of collection. The harvester can be witnessed from shore by the sampling officer. Where collection from the shellfish bed cannot be witnessed from the shore by the sampling officer (due to the remoteness of the shellfish bed or the lack of suitable and accessible vantage point), the samples are recorded as 'unverified'.

One sample of processed king scallop was also forward to the laboratory for toxin analysis as part of the FSS onshore verification monitoring in 2022.

The delivery of the 2022 monitoring programme continued throughout the Covid-19 pandemic with service maintained and delivered in a COVID secure manner.

Only 1.5% (n=35) of the biotoxin samples and 4.8% (n=99) of *E. coli* samples were rejected as unsuitable for analysis on arrival at the laboratories. Four water samples (0.3%) were rejected. All chemical contaminants samples were suitable.

All analyses followed the approved methods laid out in national legislation and specified by FSS for the purpose of this programme. All methods were accredited to ISO17025:2017 standards at the testing laboratories. Amnesic shellfish poisoning toxins (ASP) were monitored in 1076 samples, lipophilic toxins (LT) in 2,208 samples and paralytic shellfish poisoning toxins (PSP) in 1,503 samples. 1,953 samples were tested for *E. coli*, 26 for polycyclic aromatic hydrocarbons (PAHs), 25 for trace elements, and 20 samples for polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs).

All results were reported to FSS' specifications and met the required FSS turnaround times. Specifically:

- 97.5% of all toxin results were reported within 1 working day of sample receipt, 99.9% within 2 working days, 100% withing 3 working days;
- 100% of phytoplankton results were reported within 3 days of sample receipt;
- 98.6% of *E. coli* actionable results ('outwith') were reported within 3 working days of onset of analysis;
- 99.2% *of E. coli* non-actionable results were reported within 5 working days of onset of analysis;
- The draft chemical contaminant report was produced by the end of June 2022 and final report submitted in September 2022 following receipt of FSS comments.

The results of the monitoring programme are presented in each section of this report. In summary:

- 110 samples breached the maximum permitted limits (MPL) for lipophilic toxins (OA/DTX/PTX group only), 20 samples breached the MPL for PSP toxins and 4 samples breached the MPL for ASP toxins (see section 1).
- Outwith *E. coli* results were reported in 8.2% of the analyses undertaken in 2022 (see section 2).
- All chemical contaminants results were below the regulatory maximum limits (see section 3).

2. Section 1: Toxin and Phytoplankton summary

This section provides a summary of the toxin and phytoplankton monitoring undertaken in Scottish shellfish under the FSS programme in 2022. The full results of the FSS toxin and phytoplankton monitoring programmes are available on the FSS website. For results for individual RMPs (Representative Monitoring Points), please visit the Scotland's Aquaculture website at the following links:

- Biotoxin monitoring
- Phytoplankton monitoring

A total of 2,330 bivalve shellfish samples from 89 inshore sampling locations (Figure 1) were submitted to Cefas for toxin analyses in 2022. They comprised of; common mussels (1,479), Pacific oysters (533), razors (54), common cockles (175), surf clams (66) and native oysters (23). A total of 35 samples received were not forwarded for analysis. Two were due to a laboratory error, 2 were sent in error, 16 samples contained an insufficient number of live shellfish and 15 were received too late for analysis due to postal strikes in December 2022. The postal strikes throughout the second half of 2022 led to some delays in sample transport. Whilst this was outside of Cefas control, the impact was largely mitigated by scheduling samples on non-strike days during this period. However the strikes escalated to two day strikes, throughout November and December with 24 samples delayed leading to perishing or arriving after the Christmas lab closure.

One sample of processed king scallops (adductor and roe only) was collected from commercial establishments in the Dumfries and Galloway region under the scope of the FSS onshore verification programme and were submitted for toxin analysis in 2022.

A total of 1,354 seawater samples from 40 inshore sampling locations (Figure 2) were submitted to SAMS Enterprise for the identification and enumeration of potentially harmful algal species in 2022. Four of these samples were rejected, as they had been collected in error and were not on the sampling schedule.

All results were compared to the maximum permitted levels (MPL) (Table 1) stipulated in retained EU regulation 853/2004. Toxin test results must not exceed these limits in either whole body or any edible part separately. Please note that for ease of reading, in the text of this report, toxin concentrations are shown as mg/kg or µg/kg, without reference to the toxin parent.

Table 1: Maximum permitted limits of toxins in shellfish flesh.

Toxin groups	Maximum permitted limits (MPL)
Amnesic shellfish poisoning (ASP) toxins	20 mg of Domoic/epi-domoic acid per kg of shellfish flesh
Lipophilic toxins (LTs)	For Diarrhetic shellfish poisoning toxins (DSP) and pectenotoxins (PTX) together: 160 µg of okadaic acid (OA) equivalents per kg of shellfish flesh OR For Yessotoxins (YTX): 3.75 mg of YTX equivalents per kg of shellfish flesh OR For Azaspiracids (AZA): 160 µg of AZA equivalents per kg of shellfish flesh
Paralytic shellfish poisoning (PSP) toxins	800 µg of saxitoxin (STX) equivalents per kg of shellfish flesh

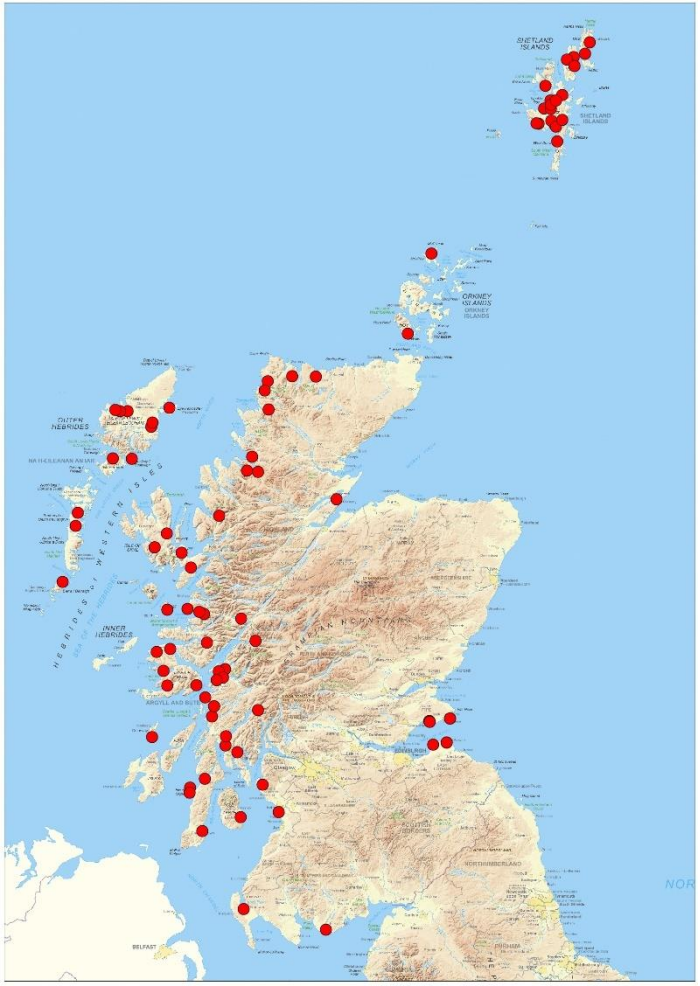

Figure 1. Scottish inshore shellfish sampling locations – Food Standards Scotland biotoxin monitoring programme in 2022.

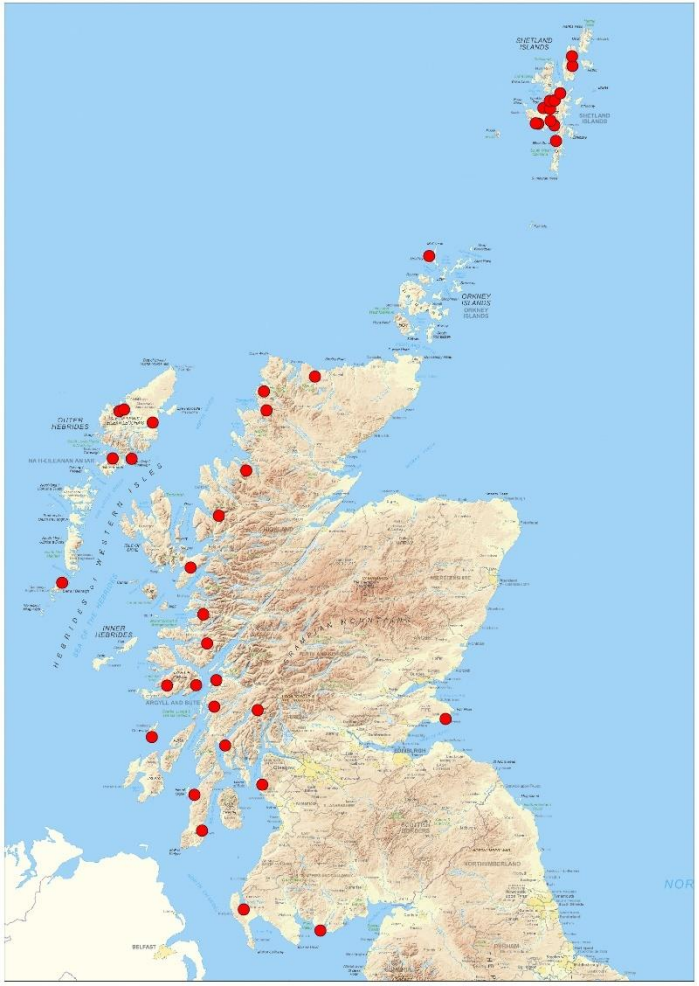

Figure 2. Scottish water sampling locations – Food Standards Scotland phytoplankton monitoring programme in 2022.

2.1. Lipophilic toxins

In total, lipophilic toxins (LTs) analyses were performed on 2,207 inshore samples and 1 verification sample. Monitoring for LTs was conducted using an ISO17025 accredited liquid chromatography with tandem mass spectrometry (LC-MS/MS) method and results are summarised below.

110 inshore samples breached the MPL for lipophilic toxins (Table 1). As highlighted in previous annual reports, where the MPL for lipophilic toxins had been exceeded and sampling had occurred in the previous two to three weeks, the LC-MS/MS method provided an early warning, detecting low toxin levels prior to closure in the majority of cases. This indicates the methods performance and advantage as an early warning mechanism, when applied to risk management practices such as the FSS "traffic light" guidance.

2.1.1. OA/DTX/PTX group

- OA/DTX/PTX group toxins were detected in 682 inshore samples, comprising of mussels (639 samples), surf clams (33), Pacific oysters (8), common cockles (1) and razors (1).
- 110 samples comprising all mussels (Figure 3) recorded results above the MPL in 2022. These results were recorded between May and September 2022.
- The highest level recorded during 2022 was 2215 µg OA eq./kg, almost 14 times the regulatory limit, in a sample from Loch Laxford (Highland Council: Sutherland) in mid July 2022. Levels of OA/DTX/PTX group toxins at this site had started to rise in mid-May, however a closure for PSP toxins suspended the LT analysis until mid-June when the first result above the MPL for OA/DTX/PTX was recorded. The site recorded its second consecutive result below the MPL in mid-September.
- Elsewhere, OA/DTX/PTX group toxins were detected below the MPL in a further 572 samples from 56 sites (Figure 4), between January and December 2022.
- No OA/DTX/PTX group toxins were detected in the Scallop verification samples received in 2022.

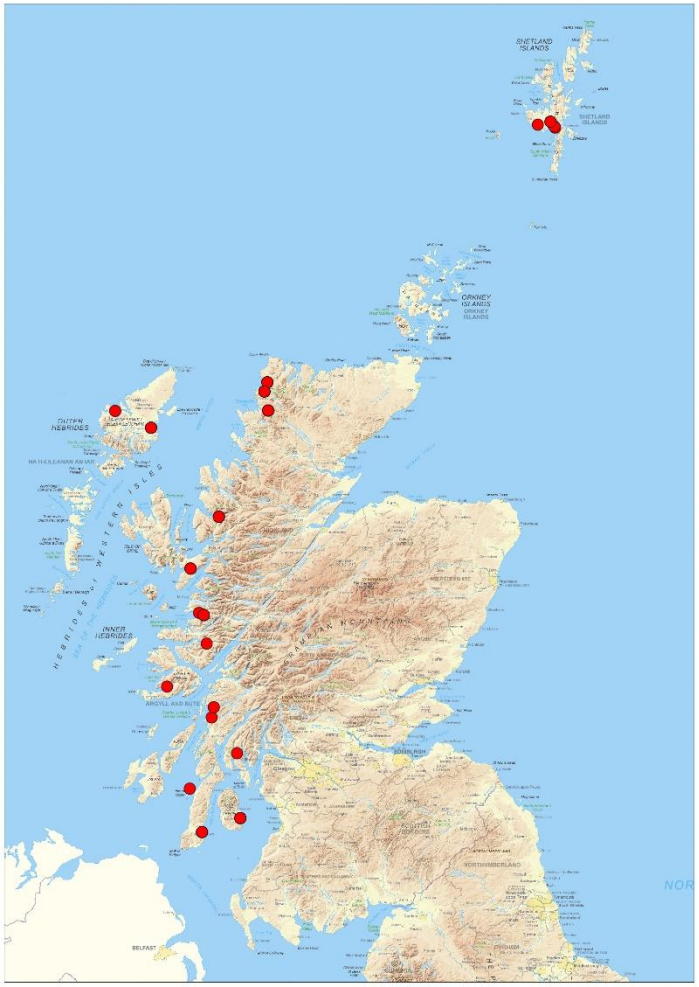

Figure 3. Inshore locations recording OA/DTX/PTX group results above the maximum permitted limit (>160µg OA eq./kg) in 2022.

Figure 4. Inshore locations where toxins of OA/DTX/PTX group were detected below the maximum permitted limit (≤160µg OA eq./kg) in 2022.

2.1.2. AZA group

AZAs were not detected in any samples during 2022.

2.1.3. YTX group

YTXs were detected in 7 inshore mussel samples collected from two sites in Argyll and Bute (Campbeltown Loch and Sound of Gigha Leim) and one in North Ayrshire (Arran: Lamlash Bay — see Figure 5) between June and August. All results were below the MPL (Table 1), with the highest level recorded as 0.5 mg YTX eq/kg in 2 samples taken on the 14th and 20th of June 2022.

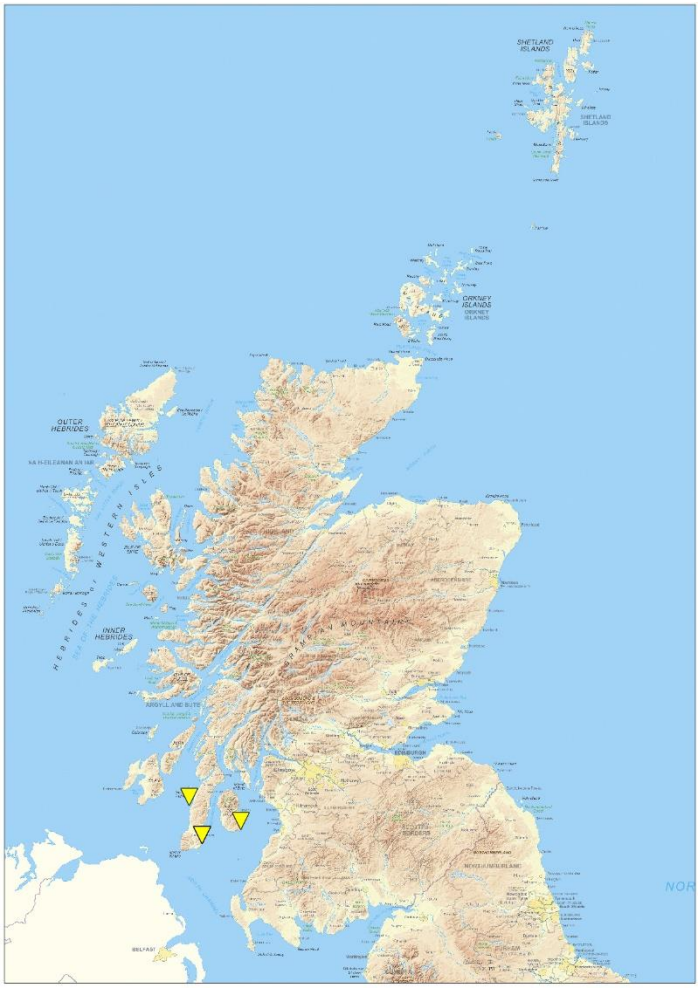

Figure 5. Inshore locations where YTX group toxins were detected in 2022 (all below the maximum permitted limit levels (3.75 mg YTX eq./kg))

2.1.4. Phytoplankton associated with the production of lipophilic toxins

- *Dinophysis* species were present in 532 (39.4%) of the 1,350 samples analysed during 2022 and were found between March and November. They were observed at or above trigger level (set at 100 cells/L) in 215 samples (15.9%) between April and September. The majority of *Dinophysis* blooms occurred around the Scottish coast from June to August 2022, with 40.0% of the samples collected in July exceeding threshold counts. (Please note that in this report, references to *Dinophysis* species also include *Phalacroma rotundatum* (synonym *Dinophysis rotundata*) and that blooms are denoted as cell counts at or exceeding trigger level, where appropriate for individual species/genera).
- The earliest blooms of *Dinophysis* breaching trigger level were recorded at three sites in the Highland region: Loch Eishort (Skye & Lochalsh) on 25th April, Loch Ailort (Lochaber) on 26th April and Loch Torridon (Ross & Cromarty) on 27th April.

- The densest blooms observed in 2022 also occurred in the Highland region, with *Dinophysis* recorded at 5,400 cells/L in Loch Torridon (Ross & Cromarty) on 30th June, and at 3,600 cells/L at Loch Laxford (Sutherland) on 4th July. Further south in Argyll & Bute, *Dinophysis* was abundant in Loch Fyne: Ardkinglas, with a bloom of 3,040 cells/L detected on 13th July. Elsewhere in Scotland, *Dinophysis* blooms were intermittently observed around Lewis & Harris from June to September, and in the Orkney Islands in July. Blooms were present in the Shetland Islands between June and August except for two sites in the north-east (on Yell) where trigger level was never breached.
- The total percentage of *Dinophysis* at or exceeding trigger level during the 2022 reporting period (15.9%) was less than in 2021 (20.5%), and the maximum bloom density was the lowest since 2014.
- The benthic dinoflagellate *Prorocentrum lima* was present in 316 (23.4%) of the samples analysed. This species is generally detected more often in the sandy sediments of shallow bays where oyster cultivation takes place, although it can also grow epiphytically on substrates such as seaweed.
- *Prorocentrum lima* was recorded from March to November and was most abundant between June and August. It was reported at or above the trigger level (set at 100 cells/L) between March and October in 78 samples (5.8%).
- The densest blooms of 2022 occurred around the Shetland Islands, with cell counts of 16,820 cells/L at Vementry South on 4th July, 12,220 cells/L at Basta Voe Cove on 28th June, and 9,760 cells/L at Mid Yell Voe East on 1st August.
- Elsewhere around the coast, *Prorocentrum lima* blooms were noted with cell densities of 1,260 cells/L at Kyle of Tongue (Highland: Sutherland) on 29th August, 1,200 cells/L at Bay of Skaill: Westray (Orkney Islands) on 4th July, and 1,100 cells/L at Ganavan (Argyll & Bute) on 27th September.
- The dinoflagellate *Protoceratium reticulatum* was detected in 30 samples (2.2%) between March and September and was most abundant in May. The 2022 maximum bloom density of 760 cells/L was recorded at Weisdale Voe (Shetland Islands) on 23rd May. A bloom of 600 cells/L was observed on 21st March in East Loch Tarbert (Lewis & Harris). No trigger level has been set for *Protoceratium reticulatum*.
- The dinoflagellate *Lingulodinium polyedra* is rarely abundant in Scottish coastal waters. In 2022 it was found on three occasions (0.2 % of samples) at two locations, Brighouse Bay (Dumfries & Galloway) and Loch Spelve (Argyll & Bute) in July and September. The 2022 maximum concentration of 60 cells/L was recorded at Brighouse Bay on 5th September. No trigger level has been set for *Lingulodinium polyedra*.

2.2. PSP toxins

A total of 1,502 inshore samples and 1 scallop verification sample were tested for paralytic shellfish poisoning (PSP) toxins in 2022. All samples were tested by an ISO17025 accredited high-performance liquid chromatography (HPLC) method and results are summarised below.

- Twenty samples from eight monitoring sites (Figure 6) were found to contain PSP toxins above the MPL of 800µg STX eq./kg shellfish flesh. All were mussels' samples collected between April and mid-July. Samples originated from the Argyll and Bute, Ross and Cromarty, Sutherland and Shetland regions.
- The highest level recorded was 11,349 µg/kg recorded in Pod 47 – Loch Inchard in a sample collected 23rd of May 2022.
- PSP toxins above reporting levels, but below the MPL were detected in a further 27 samples comprising mussels (25 samples), cockles (1) and Pacific oysters (1) from 15 separate pods (Figure 7). All occurrences were recorded between end of March and early August 2022.
- A further 6 samples (5 mussels and 1 Pacific oysters) were subjected to full quantitative analysis but returned results below the reporting limit for the test.
- The PSP toxin profiles predominantly consisted of the toxins Saxitoxin (STX), Gonyautoxins (GTX) 2&3, GTX1&4, Neosaxitoxin (NEO) and C toxins 1&2 (data not shown). Lower concentrations of GTX5 and dcSTX were also detected in some shellfish samples. Proportions of each toxin varied considerably, but the profiles were consistent with previous years, and similar to those expected from shellfish contaminated with *Alexandrium* as documented in Turner et al, 2014., with profiles dominated by GTX1&4, GTX2&3, NEO and STX.
- No quantifiable levels of PSP toxins were detected in the scallop verification sample.

Phytoplankton associated with the production of PSP toxins:

- Dinoflagellates belonging to the genus *Alexandrium* were observed between February and October. They were detected in 450 (33.3%) of the 1,350 samples analysed during 2022 and recorded at every site monitored for phytoplankton. *Alexandrium* cells were reported at or above the trigger level (set at 40 cells/L) in 312 samples (23.1%). Blooms were most frequently observed in May and June, and 42.5% of the samples analysed in June breached the *Alexandrium* trigger level.
- The earliest *Alexandrium* bloom of 2022 occurred in Loch Laxford (Highland: Sutherland) on 1st March. An early bloom was also detected in Dales Voe (Shetland Islands) on 8th March. The densest *Alexandrium* bloom of 2022 occurred in Loch Ryan (Dumfries & Galloway) on 1st August where a concentration of 4,360 cells/L was recorded.

Relatively dense blooms were observed elsewhere around the coast, with *Alexandrium* at 3,460 cells/L at Kilfinichan Bay (Argyll & Bute) on 3rd May, 3,080 cells/L at Bay of Skaill: Westray (Orkney Islands) on 30th May, and 3,040 cells/L at Loch Laxford (Highland: Sutherland) on 16th May.

- Detection of paralytic shellfish toxins above half the maximum permitted level at Campbeltown Loch (Argyll & Bute), Loch Eishort (Highland: Skye & Lochalsh), Loch Torridon (Highland: Ross & Cromarty), Loch Laxford (Highland: Sutherland), Weisdale Voe, Sandsound Voe and East of Linga (Shetland Islands) was always preceded by *Alexandrium* breaching trigger level in the previous week. The only exceptions were Loch Glencoul (Highland: Sutherland) and Braewick Voe (Shetland Islands) when *Alexandrium* was recorded above trigger level in the same week. The presence of toxin producing *Alexandrium* varied by region, generally occurring from March through to June in Argyll & Bute and around the Highlands, May, June and August around Lewis & Harris, and from May to September in the Shetland Islands.
- The percentage of samples with *Alexandrium* counts at or above trigger level in 2022 (23.1%) was higher than in 2021 (20.7%).

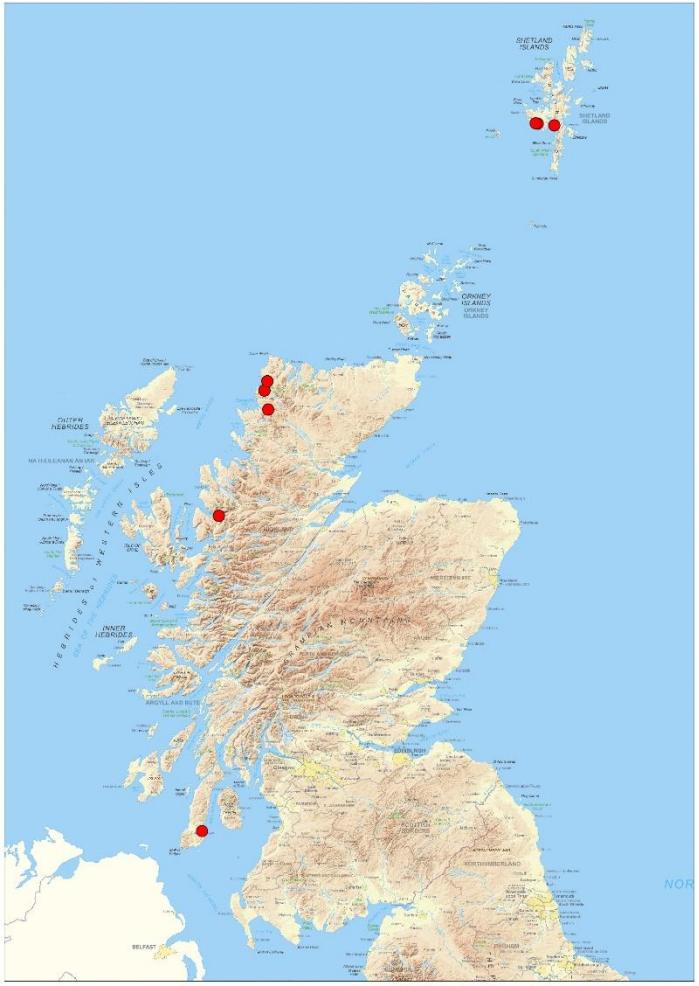

Figure 6. Inshore locations recording PSP toxin results above the maximum permitted limit (>800µg STX eq./kg) in 2022

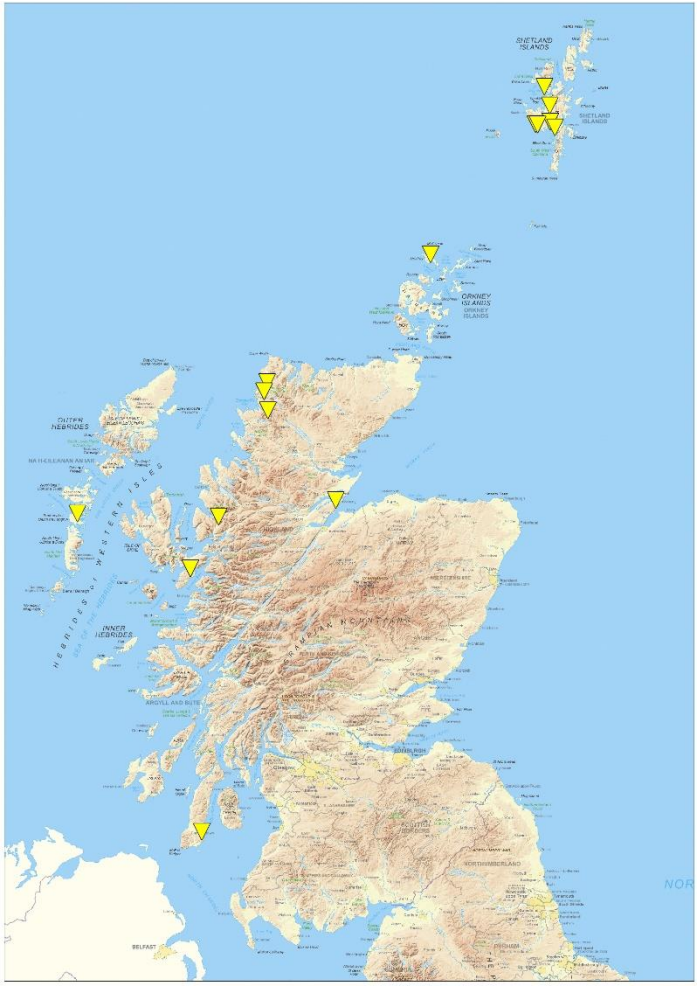

Figure 7. Inshore locations recording PSP toxin results below the maximum permitted limit (≤800µg STX eq./kg) in 2022

2.3. ASP toxins

Analyses for amnesic shellfish poisoning (ASP) toxin were conducted on 1,076 inshore samples and 1 scallop verification samples. All samples were analysed by an ISO17025 accredited HPLC method. Results are summarised below.

- ASP toxins were detected in 96 inshore samples comprising of: common mussels (46 samples), Pacific oysters (29), common cockles (9), surf clams (11) and razors (1) (Figure 8 & 9).
- Four mussel samples exceeded the MPL (20mg/kg) in 2022. Three of these originated in the Shetland Isles and had been collected between late June and early July 2022. The other sample originated from the Highland Council Sutherland area and had been collected in mid-June. The highest concentration recorded (95 mg/kg) was in a sample collected from the Gruting Voe: Braewick Voe production area in July 2022.
- Concentrations below the MPL were recorded throughout 2022. The peak period occurred between May & September, during which time ASP was detected in 73 samples.
- ASP toxins were not detected in the scallop verification sample received in December 2022.

Phytoplankton associated with the production of ASP toxins

- Diatoms belonging to the genus *Pseudo-nitzschia* were detected from January to November in 2022 and were present in 1,223 (90.6%) of the 1,350 samples analysed. Blooms (here referred to as cell densities exceeding the trigger level of 50,000 cells/L) were detected between March and October and were most frequently observed in June and September. *Pseudo-nitzschia* counts at or above the trigger level were recorded in 108 samples (8.0%), with 13.8% of the samples analysed in both June and September exceeding this level.
- The earliest blooms of 2022 occurred in Highland: Ross & Cromarty and Argyll & Bute, with 148,217 cells/L detected in Little Loch Broom, and 69,527 cells/L in Loch Spelve, respectively, both on 22nd March. *Pseudo-nitzschia* blooms were also widespread around the Shetland Islands in late March and early April. The densest *Pseudo-nitzschia* bloom of 2022 was recorded at Basta Voe Cove (Shetland Islands) on 14th June, where cell counts reached in excess of 1.5 million cells/L. This bloom did not appear to have any associated amnesic shellfish toxicity, in contrast to the relatively less dense blooms present around the Shetland Islands in late June into July. Elsewhere around the coast, a bloom of toxic *Pseudo-nitzschia* was present in Loch Glencoul (Highland: Sutherland), reaching a maximum density of 142,095 cells/L on 6th June.

- The percentage of samples with *Pseudo-nitzschia* counts at or above trigger level in 2022 (8.0%) was lower than in 2021 (11.7%).
  However, the apparent increase in the frequency of detection of amnesic shellfish toxins compared to 2021 may be a result of more testing when *Pseudo-nitzschia* blooms were present around the Shetland Islands, where sites were subject to comparatively fewer closures for diarrhetic shellfish toxins than in previous years.

Figure 8. Inshore locations where ASP toxins were detected above the maximum permitted limit (>20mg/kg) in 2022.

Figure 9. Inshore locations where ASP toxins were detected below the maximum permitted limit (>20mg/kg) in 2022.

2.4. Other potentially harmful phytoplankton

The dinoflagellate *Prorocentrum cordatum* was detected in 546 samples (40.4%) analysed in 2022. It was observed from March through to October, and was most frequently recorded between May and June, being present in 70.3% of the May samples. *Prorocentrum cordatum* was widespread around the Scottish coast and found at all sites, although rarely in large numbers and typically less than 12,000 cells/L. One exception was a bloom in Sandsound Voe (Shetland Islands), which reached 158,205 cells/L on 13th June. No trigger level has been set for this species.

The potentially problematic dinoflagellate *Karenia mikimotoi* was found in 198 (14.7%) of the samples analysed. It was present between March and October, but most frequently observed between May and September, being detected in 23.5% of the samples collected in August. This species is not an issue in terms of shellfish harvesting, as it does not produce biotoxins that are harmful to human health, although it may negatively impact aquaculture. It produces ichthyotoxins that can kill finfish, and dense blooms of the order of several million cells/L may result in both fish and invertebrate mortality due to hypoxia. Cell abundance was much lower than in 2021, with a maximum density of 11,200 cells/L observed in Loch Eishort (Highland: Skye & Lochalsh) on 23rd May.

2.5. Programme review & recommendations

2.5.1. Toxin monitoring

Sampling and testing frequencies for toxin and phytoplankton monitoring are defined by FSS, as the competent authority, based on the results of risk assessments which FSS commissioned in 2004 (Holtrop & Horgan), 2008 (Holtrop) and 2016 (Holtrop et al.). The recommendations of the 2019 risk assessment led to testing frequencies been defined and implemented for each site separately. The aim of the review conducted for this report was to look at toxin occurrence over the last couple of years (based on the results of the FSS official monitoring alone as industry data was not available) and identify sites where the set testing frequency may need adjustment, as a result of a recent change to toxin incidence and levels at these sites.

Areas listed below are recommended for review by FSS:

- Pods 49 and 64: June 2022 all recorded ASP above the MPL – current testing frequency is monthly.
- Pods 61 and 70: July 2022 all recorded ASP above the MPL – current testing frequency is monthly.

- Pod 108: May 2022 recorded PSP above the trigger level and August 2022 recorded LTs above the trigger level – current testing frequency is monthly.
- Pod 127: July 2022 PSP above the trigger level – current testing frequency is monthly.
- Pod 133: May 2022 recorded PSP toxins below trigger level – current testing frequency is monthly.

2.5.2. Phytoplankton monitoring

The phytoplankton monitoring points used in 2022 were reviewed and suggested changes are outlined in Table 2 below. Discussions will need to take place with the sampling contractor to ensure that sampling can be undertaken safely from the suggested alternative sampling points if a change to RMP was agreed.

Table 2. Recommended changes to phytoplankton monitoring RMPs

2022 phytoplankton RMP	Recommended phytoplankton RMP for 2023
Pod 39: Little Loch Broom	Pod 39: Loch Broom
Pod 87: Anstruther	Pod 80: Shorth Estuary Shell Bay Or Pod 108: Cromarty Firth

3. Section 2: *E. coli* summary

This section provides a summary of the microbiological monitoring undertaken in Scottish shellfish under the FSS programme in 2022. All data generated under the Scottish shellfish harvesting classification programme is available on the Cefas website. *E.coli* results are also available on the Scotland's Aquaculture website and on the FSS' website.

3.1. Sample collections and analyses

A total of 2,052 bivalve shellfish samples from 173 RMPs were submitted for microbiological analyses in 2022. 4.4% of the samples received were of unverified origin. The sampling locations covered classified production areas within 10 Local Authority regions (14 regional offices). The samples comprised of the species identified in Table 3.

Table 3. Number of samples collected for the FSS microbiological monitoring programme, by bivalve species in 2022.

Common name	Latin name	No. samples received in 2022	% of total
Common mussels	*Mytilus* spp	1013	49.4
Pacific oysters	*Crassostrea gigas* (*Magallana gigas*)	439	21.4
Common cockles	*Cerastoderma edule*	326	15.9
Razor clams	*Ensis* spp	196	9.6
Surf clams	*Spisula solida*	38	1.9
Native oysters	*Ostrea edulis*	13	0.6
Pullet carpet shell	*Venerupis corrugata*	12	0.6
Sand Gaper	*Mya arenaria*	15	0.7

The majority of samples (98.7%) arrived at the laboratory within 48h of sample collection. When delays occurred, these were generally attributed to the time at which the samples were collected, thus missing the routine post office collection deadline, or to other events outside of the laboratory or sampling officers' control, such as inclement weather, transport network problems or postal strikes.

4.8% (*n*=99) of the samples received at the laboratories were rejected on arrival. Almost all of the rejections (n=98) were due to exceedance of the time/temperature criteria set out in FSS protocols.

Analyses were initiated within 48h of sample collection and samples analysed using the FSS specified method for enumeration of *E. coli* in shellfish (ISO 16649-3:2015 (ISO 2015)).

Initial preparation of shellfish samples followed ISO 6887-3 (ISO 2003) and derivation of MPN results ISO 7218 (ISO 2007). Methods are accredited to ISO17025 standard. A total of 1,953 tests were undertaken in 2022.

All results were compared to the classification categories are set out in Table 4.

Table 4. Criteria for the classification of bivalve shellfish harvesting areas.

Classification category	Microbiological standard[1]
Class A	Samples of live bivalve molluscs from these areas must not exceed, in 80% of samples collected during the review period, 230 *E. coli* per 100 g of flesh and intra-valvular liquid. The remaining 20% of samples must not exceed 700 *E. coli* per 100 g of flesh and intra-valvular liquid[2]
Class B	Live bivalve molluscs from these areas must not exceed, in 90% of the samples, 4 600 MPN *E. coli* per 100 g of flesh and intra-valvular liquid. In the remaining 10% of samples, live bivalve molluscs must not exceed 46 000 MPN *E. coli* per 100 g of flesh and intra-valvular liquid[3]
Class C	Live bivalve molluscs from these areas must not exceed 46 000 *E. coli* MPN per 100 g of flesh and intra-valvular liquid[4]

3.2. Results by local authority region

Summaries of samples received, rejected and providing results outwith of their classification are shown in Tables 5 to 18 for each classified production area in each local authority region.

3.2.1. Argyll & Bute

Table 5. *E. coli* samples received from Argyll & Bute Council area.

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Ardencaple	Ardencaple cockles	AB 818 2146 04	Common cockles	13	5	0

[1] The reference method for analysis of *E. coli* is the detection and Most Probably Number (MPN) technique specified in EN/ISO 16649-3. Alternative methods may be used if they are validated against this reference method in accordance with the criteria in EN/ISO 16140 (Regulation (EC) 854/2004 as amended by Regulation (EC) 2285/2015).
[2] Regulation (EC) 854/2004 as amended by Regulation (EC) 2285/2015.
[3] Regulation (EC) 854/2004 as amended by Regulation (EC) 1021/2008
[4] Regulation (EC) 854/2004

Campbeltown Loch	Kildalloig Bay	AB 029 008 04	Common cockles	13	0	2
Castle Stalker	Port Appin	AB 492 909 04	Common cockles	12	3	0
Colonsay	The Strand (East)	AB 041 1199 13	Pacific oysters	12	0	1
Colonsay East of the Strand	Islands of Colonsay and Oransay	AB 774 1987 16	Razors	12	0	1
Dunstaffnage Cockles	Dunstaffnage Bay	AB 696 1511 04	Common cockles	12	0	0
East Tarbert Bay	Isle of Gigha	AB 541 972 13	Pacific oysters	14	2	1
Eilean an Atha	Eilean an Atha	AB 877 2390 13	Pacific Oyster	11	1	1
Eilean Gainimh	Eilean Gainimh	AB 870 2379 24	Pullet Carpet Shell	12	0	0
Eriska Shoal	Eriska Shoal Cockles	AB 490 907 04	Common cockles	12	1	0
Ganavan Cockles	Ganavan	AB 697 1512 04	Common cockles	12	0	0
Islay	Loch Gruinart Craigens	AB 094 011 13	Pacific oysters	11	1	1
Kerrera East	Ardantrive	AB 697 1513 04	Common cockles	14	1	2
Kerrera West	Oitir Mhor	AB 697 1514 04	Common cockles	13	6	2
Kilfinichen Bay	Kilfinichen Bay	AB 695 1507 04	Common cockles	12	2	0
Loch A Chumhainn: Inner Deep Site	Inner Deep Site	AB 112 017 13	Pacific oysters	14	4	2
Loch A Chumhainn: Outer	Outer	AB 113 018 13	Pacific oysters	13	0	2
Loch Craignish Cockles	Ardfern	AB 786 2028 04	Common cockles	12	2	0
Loch Creran Cockles	Loch Creran Cockles	AB 729 1685 04	Common cockles	12	0	0
Loch Creran Upper Oysters	East Barrington	AB 129 021 13	Pacific oysters	12	4	0
Loch Creran: Rubha Mor	Rubha Mor	AB 130 022 13	Pacific oysters	13	1	0

Loch Fyne: Ardkinglas Oysters	The Shore	AB 147 036 13	Pacific oysters	13	1	1
Loch Fyne: Otter Ferry	Balliemore	AB 151 039 13	Pacific oysters	12	1	0
Loch Fyne: Otter Point	Otter Point	AB 714 1659 04	Common cockles	12	1	0
Loch Gair	Loch Gair Common Cockles	AB 863 2347 04	Common cockles	14	0	2
Loch Linnhe	Loch Linnhe	AB 172 047 13	Pacific oysters	12	1	0
Loch na Cille	Loch na Cille Cockles	AB 617 1204 04	Common cockles	12	1	0
Loch Na Keal	Eilean Liath	AB 284 080 13	Pacific oysters	13	1	1
Loch Na Keal West	Eilean Casach	AB 286 082 13	Pacific oysters	13	2	1
Loch Riddon Cockles	Loch Riddon Cockles	AB 656 1409 04	Common cockles	14	2	2
Loch Spelve Cockles	North West Spelve	AB 767 1963 04	Common cockles	12	1	0
Loch Spelve Croggan Pier	Croggan Pier	AB 199 055 13	Pacific oysters	12	2	1
Loch Spelve North	Ardura	AB 200 1915 08	Common mussels	14	0	2
Lynn of Lorn Sgeir Liath	Sgeir Liath	AB 318 068 13	Pacific oysters	13	1	1
North Connel Cockles	Ledaig Point Cockles	AB 758 1909 04	Common cockles	14	2	1
Oitir Mhor Bay	Oitir Mhor	AB 308 701 13	Pacific oysters	13	3	2
Porte Na Coite	Porte Na Coite	AB 876 2389 13	Pacific oysters	15	0	3
Seil Point	Poll a' Bhrochain (Cyster)	AB 245 070 13	Pacific oysters	12	1	0
Seil Sound East	East of Balvicar	AB 247 703 08	Common mussels	10	0	0
Seil Sound North	Balvicar North	AB 247 735 13	Pacific oysters	10	0	0
West Jura Razors	Jura	AB 482 805 16	Razors	10	0	2

3.2.2. Comhairle Nan Eilean Siar - Lewis & Harris

Table 6. *E. coli* samples received from Comhairle Nan Eilean Siar - Lewis & Harris

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Broad Bay Aiginish	Aiginish	LH 743 1740 16	Razors	13	0	2
East Loch Tarbert	Sound of Scalpay	LH 057 106 08	Common mussels	12	2	0
Loch Erisort: Garbh Eilean	Garbh Eilean	LH 357 747 08	Common mussels	12	0	0
Loch Erisort: Gob Glas	Gob Glas	LH 357 711 08	Common mussels	5	0	0
Loch Leurbost	Eilean Mhiabhaig	LH 168 732 08	Common mussels	12	0	0
Loch Leurbost: Crosbost	Site 1 Crosbost	LH 339 795 13	Pacific oysters	13	3	1
Loch Roag - Gob Sgrithir	Gob Sgrithir	LH 829 2215 08	Common mussels	13	1	1
Loch Roag: Barraglom	Loch Barraglom	LH 185 120 08	Common mussels	13	0	1
Loch Roag: Ceabhagh	Keava	LH 381 772 08	Common mussels	12	1	0
Loch Roag: Drovinish	Loch Drovinish	LH 186 121 08	Common mussels	12	0	0
Loch Roag: Eilean Chearstaigh	Eilean Scarastaigh	LH 344 697 08	Common mussels	13	0	1
Loch Roag: Eilean Teinish	Eilean Teinish	LH 338 720 08	Common mussels	13	1	1
Loch Roag: Linngeam	Cliatasay	LH 187 699 08	Common mussels	13	0	1
Loch Roag: Miavaig	Miavaig	LH 188 123 08	Common mussels	13	1	1
Loch Roag: Torranish	Loch Torranish	LH 189 124 08	Common mussels	12	0	0
Loch Seaforth	Loch Seaforth	LH 193 126 08	Common mussels	13	0	1
Seilebost	Seilebost	LH 249 129 04	Common cockles	12	2	0

3.2.3. Comhairle Nan Eilean Siar - Uist & Barra

Table 7. *E. coli* samples received from Comhairle Nan Eilean Siar - Uist & Barra

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Ardmhor	Ardmhor	UB 874 2385 13	Pacific oysters	13	1	1
Cidhe Eolaigearraidh	Sound Of Barra: Pacific Oysters	UB 427 830 13	Pacific oysters	14	3	2
North Ford	Oitir Mhor	UB 493 852 04	Common cockles	12	1	0
South Ford	South Ford	UB 259 162 04	Common cockles	12	2	0
Traigh Cille Bharra Cockles	Traigh Cille Bharra Cockles	UB 392 790 04	Common cockles	15	1	2
Traigh Mhor	Traigh Mhor	UB 282 165 04	Common cockles	12	2	2

3.2.4. Dumfries & Galloway

Table 8. *E. coli* samples received from Dumfries & Galloway Council area.

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Fleet Bay Razors	Fleet Bay Razors	DG 752 1880 16	Razors	5	0	1
Kirkcudbright Bay Razors	Kirkcudbright Bay Razors	DG 809 2132 16	Razors	10	4	0
Loch Ryan	Leffnoll Point	DG 191 174 12	Native oysters	13	0	2
Loch Ryan West Side	Loch Ryan West Side	DG 885 2418 18	Sand gapers	15	0	1
Wigtown Bay: Islands of Fleet	Wigtown Bay	DG 305 182 16	Razors	10	1	0

3.2.5. East Lothian

Table 9. *E. coli* samples received from East Lothian Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Gullane Point North	Gullane North	EL 601 1087 16	Razors	11	3	2
Gullane Point South	Gullane South	EL 703 1525 16	Razors	11	2	2
North Berwick Razors	North Berwick Razors	EL 736 1707 16	Razors	10	3	1

3.2.6. Fife

Table 10. *E. coli* samples received from Fife Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Elie Razors	Elie Razors	FF 868 2365 16	Razors	12	0	1
Fife Ness Surf Clams	Kingsbarns	FF 771 1974 19	Surf Clams	12	0	0
Firth of Forth: North	Anstruther	FF 068 184 19	Surf Clams	13	0	0
Forth Estuary Surf Clams	Shell Bay	FF 772 1975 19	Surf Clams	13	0	0
Forth Estuary: Largo Bay	Largo Bay	FF 072 188 16	Razors	12	0	1

3.2.7. Highland - Lochaber

Table 11. *E. coli* samples received from Highland Council: Lochaber area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Arisaig	Sgeirean Buidhe	HL 004 202 13	Pacific oysters	12	1	0
Camas a Chuilinn: Loch Linnhe	Camas a Chuilinn: Loch Linnhe	HL 875 2386 08	Common mussels	12	1	0

Kildonan Oysters	Kildonan Bay	HL 796 2082 13	Pacific oysters	12	0	1
Loch Ailort	Eilean Dubh	HL 114 937 08	Common mussels	11	0	0
Loch Ailort 1	Loch Ailort 1	HL 114 214 08	Common mussels	11	0	0
Loch Ailort 3	Camus Driseach	HL 114 207 13	Pacific oysters	13	0	1
Loch Beag	Ardnambuth	HL 118 215 08	Common mussels	11	1	0
Loch Eil	Duisky	HL 134 216 08	Common mussels	12	2	0
Loch Eil: Fassfern	Fassfern	HL 136 219 08	Common mussels	12	1	0
Loch Leven: Lower	Lower	HL 170 222 08	Common mussels	13	1	1
Loch Leven: Upper	Upper	HL 171 223 08	Common mussels	13	0	1
Loch Moidart	South Channel	HL 179 227 13	Pacific oysters	6	1	0
Loch Sunart	Liddisdale	HL 206 1237 08	Common mussels	14	2	1

3.2.8. Highland- Ross and Cromarty

Table 12. *E. coli* samples received from Highland Council: Ross and Cromarty area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Cromarty Firth Mussels	Cromarty Firth Mussels	RC 884 2413 08	Common Mussels	19	0	1
Inner Loch Torridon	Dubh Aird	RC 090 1616 08	Common mussels	13	0	1
Little Loch Broom	Little Loch Broom	RC 805 2122 13	Pacific oysters	15	1	2
Loch Broom Mussels	Loch Broom Mussels	RC 878 2396 08	Common mussels	15	0	3
Loch Kanaird	Ardmair	RC 625 1233 13	Pacific oysters	14	2	2

3.2.9. Highland - Skye and Lochalsh

Table 13. *E. coli* samples received from Highland Council: Skye and Lochalsh area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Kyles of Scalpay	Kyles of Scalpay Cockles	SL 864 2348 04	Common cocles	14	2	2
Loch Eishort	Drumfearn	SL 137 281 08	Common mussels	13	0	1
Loch Harport Inner Cockles	Carbost Cockles	SL 890 2350 04	Common cockles	14	4	3
Loch Harport: Inner	Carbost	SL 159 286 13	Pacific oysters	12	3	1
Loch Portree Cockles	Loch Portree Cockles	SL 880 2405 04	Common cockles	12	1	1
Loch Sligachan Cockles	Inner Loch	SL 889 2436 04	Common cockles	6	0	2

3.2.10. Highland - Sutherland

Table 14. *E. coli* samples received from Highland Council: Sutherland area.

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Kyle of Durness	Keoldale	HS 773 1984 13	Pacific oysters	13	1	1
Kyle of Tongue	Kyle of Tongue	HS 103 303 13	Pacific oysters	13	2	1
Loch Glencoul	Kylesku	HS 157 310 08	Common mussels	14	0	2
Loch Inchard	Loch Inchard - Site 1 - D. Ross	HS 162 311 08	Common mussels	12	0	0
Loch Laxford	Weavers Bay	HS 167 320 08	Common mussels	13	0	1

3.2.11. North Ayrshire

Table 15. *E. coli* samples received from North Ayrshire Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Lamlash Bay	Arran: Lamlash Bay	NA 007 329 08	Common mussel	15	0	1
Fairlie	Southannan Sands	NA 065 332 13	Pacific oysters	12	1	0
Stevenston Sands Razors	Stevenston Sands Razors	NA 825 2169 16	Razors	14	2	3

3.2.12. Orkney Islands

Table 16. *E. coli* samples received from Orkney Islands Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Bay of Skaill	Westray	OI 871 2380 13	Pacific oysters	12	0	0
North Bay Oysters	Hoy	OI 865 234913	Pacific oysters	13	3	1

3.2.13. Shetland Islands

Table 17. *E. coli* samples received from the Shetland Islands Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Aith Voe Sletta	Slyde	SI 326 733 08	Common mussels	12	2	0
Baltasound Mussels	Baltasound Mussels South	SI 010 2417 08	Common mussels	12	0	0
Basta Voe Cove	Inner - Site 1 - Thomason	SI 324 399 08	Common mussels	12	0	0
Basta Voe Outer	Outer	SI 323 403 08	Common mussels	12	2	0
Brindister Voe	Brindister Voe	SI 023 406 08	Common mussels	11	1	0
Busta Voe Lee North	Hevden Ness	SI 327 755 08	Common mussels	12	1	0

Busta Voe Lee South	Linga	SI 328 411 08	Common mussels	12	1	0
Catfirth	Catfirth	SI 032 412 08	Common mussels	8	0	0
Catfirth Mussels 1	East of Little Holm	SI 816 2144 08	Common mussels	12	0	0
Catfirth Mussels 2	East of Brunt Hamarsland	SI 817 2147 08	Common mussels	8	0	0
Clift Sound Houss	Clift Sound Houss	SI 633 1270 08	Common mussels	12	0	0
Clift Sound: Booth	Booth	SI 036 413 08	Common mussels	12	2	0
Clift Sound: Stream Sound	East Hogaland	SI 035 414 08	Common mussels	12	0	0
Clift Sound: Whal Wick	Wester Quarff	SI 038 1522 08	Common mussels	12	0	0
Colla Firth	Colla Firth	SI 040 417 08	Common mussels	12	0	0
Dales Voe - Fora Ness	West Taing	SI 502 869 08	Common mussels	12	1	0
Dales Voe: Scarvar Ayre	Scarvar Ayre	SI 050 420 08	Common mussels	12	3	0
Gon Firth	Cole Deep	SI 076 1338 08	Common mussels	12	1	0
Gruting Voe: Braewick Voe	Braewick Voe	SI 080 424 08	Common mussels	12	1	0
Gruting Voe: Browland Voe	Browland Voe	SI 081 425 08	Common mussels	11	1	0
Gruting Voe: Quilse	Quilse	SI 083 427 08	Common mussels	12	0	0
Gruting Voe: Seli Voe	Seli Voe	SI 084 428 08	Common mussels	12	0	0
Hamar Voe	Hamar Voe	SI 655 1404 08	Common mussels	11	0	0
Hamnavoe	Copister	SI 348 736 08	Common mussels	5	0	0
Lang Sound	Lang Sound	SI 107 429 08	Common mussels	12	0	0
Lee of Vollister	Whale Firth	SI 760 1920 08	Common mussels	9	0	0

Mid Noost Pacific Oysters	Mid Noost Pacific Oysters	SI 882 2408 13	Pacific oysters	14	1	0
Mid Yell Voe	Seafield	SI 216 432 08	Common mussels	12	3	0
Mid Yell Voe East	Bunya Sands	SI 797 2083 08	Common mussels	12	2	0
Muckle Roe	Pobies Geo	SI 221 433 08	Common mussels	12	2	0
North Uyea	North	SI 230 453 08	Common mussels	12	1	0
Olna Firth Inner	Inner	SI 232 435 08	Common mussels	12	1	0
Olna Firth Outer	Foula Wick	SI 232 434 08	Common mussels	12	1	0
Papa Little Voe	Millburn	SI 235 1350 08	Common mussels	12	1	0
Point of Hamna Ayre	Point of Hamna Ayre	SI 374 763 08	Common mussels	12	1	0
Sandsound Voe	Sandsound Voe	SI 242 443 08	Common mussels	12	3	0
South of Houss Holm	South of Houss Holm	SI 261 444 08	Common mussels	12	0	0
South Voe Mussels	South Voe Mussels	SI 421 825 08	Common mussels	12	0	0
Stream Sound: Ux Ness	Easterdale	SI 373 1096 08	Common mussels	12	1	0
Stromness Voe	Burra Holm	SI 273 467 08	Common mussels	12	0	0
Swining Voe	North West of Cul Houb	SI 820 2156 08	Common mussels	12	0	0
The Rona	Aith Ness	SI 517 944 08	Common mussels	12	1	0
Uyea Sound	Cow Head	SI 441 845 08	Common mussels	12	0	0
Vaila Sound - East Ward	Brandy Ayre	SI 858 2312 08	Common mussels	12	0	0
Vaila Sound Linga	Linga	SI 288 457 08	Common mussels	12	0	0
Vaila Sound: East of Linga and Galtaskerry	Whitesness	SI 288 1061 08	Common mussels	12	0	0

Vaila Sound: Riskaness	Riskaness	SI 289 458 08	Common mussels	12	0	0
Vementry North	Suthra Voe West	SI 322 464 08	Common mussels	10	1	0
Vementry South	Clousta Voe - Noonsbrough	SI 321 459 08	Common mussels	11	0	0
Vementry South	Seggi Bight	SI 321 462 08	Common mussels	1	0	0
Wadbister Voe	Wadbister Voe	SI 294 466 08	Common mussels	12	1	0
Weisdale Voe	North Flotta	SI 297 469 08	Common mussels	11	0	0
Weisdale Voe Upper	Olligarth	SI 378 1521 08	Common mussels	10	0	0
West of Lunna	Cul Ness	SI 380 770 08	Common mussels	12	0	0

3.2.14. South Ayrshire

Table 18. *E. coli* samples received from South Ayrshire Council area

Production Area	Site Name	Site	Sample Species	Samples received	Outwiths	Rejected samples
Ayr Bay	Ayr Bay Razors	SA 841 2263 16	Razors	10	2	0
Ayrshire Coast South	Ayrshire Coast South Razors	SA 867 2363 16	Razors	2	0	0
Croy Bay	Culzean Bay	SA 681 1482 16	Razors	7	0	1
Croy Bay South	Girvan Mains	SA 872 2381 16	Razors	4	0	0
Heads of Ayre	Heads of Ayre Razors	SA 866 2362 16	Razors	10	1	0
North Bay	Barassie	SA 337 719 16	Razors	12	1	1
Prestwick Shore	Prestwick Shore Razors	SA 840 2262 16	Razors	11	1	1
Troon South Beach	Troon South Beach Razors	SA 843 2267 16	Razors	10	0	0

3.3. Outwith results in 2022

The number of outwith results (i.e. those which exceeded the upper *E. coli* MPN/100g for the extant classification status) are reported for all classified production areas by local authority in Table 19.

Table 19. Outwith results reported in 2022

Local Authority	No. valid results reported	No. Outwith results	% outwith
Argyll and Bute Council	477	53	11.1%
Comhairle nan Eilean Siar: Lewis & Harris	196	11	5.6%
Comhairle nan Eilean Siar: Uist & Barra	73	10	13.7%
Dumfries and Galloway Council	49	5	10.2%
East Lothian	27	8	29.6%
Fife Council	60	0	0%
Highland Council: Lochaber	147	10	6.8%
Highland Council: Ross & Cromarty	67	3	4.5%
Highland Council: Skye & Lochalsh	61	10	16.4%
Highland Council: Sutherland	60	3	5%
North Ayrshire Council	37	3	8.1%
Orkney Islands Council	24	3	12.5%
Shetland Islands Council	612	36	5.9%
South Ayrshire Council	63	5	7.9%
Total	1953	160	8.2%

4. Section 3: Chemical contaminants summary

This section provides a summary of the chemical contaminants monitoring undertaken in Scottish shellfish under the FSS programme between January and March 2022. A full copy of the report produced by Fera and published in September 2022 is available on FSS' website.

Twenty-seven samples of shellfish, including species of common mussels (16 samples), Pacific oysters (6), common cockles (2) and razor clams (3). The sampling schedule was timed to coincide with the period before annual spawning. This point in the annual cycle contaminant levels would likely be at their highest for optimum detection.

This study on chemical contaminants in shellfish from Scottish classified shellfish production areas, fulfils part of the requirements from retained EU Regulations (EC) 1881/2006 and (EC) 854/2004 on adopting appropriate monitoring measures and carrying out compliance checks on shellfish produced for human consumption. Marine shellfish bio-accumulate environmental contaminants because of their inability to metabolise these during feeding. The study determines concentrations of regulated environmental contaminants in the flesh of edible species with a view to determine current levels of occurrence and to allow estimation of consumer exposure.

Twenty-six samples analysed for polycyclic aromatic hydrocarbons (PAHs), 25 for trace elements, and 20 samples for polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polychlorinated biphenyls (PCBs). The methodologies used for the analyses were UKAS accredited to ISO 17025 standard.

All measured analytes were below their maximum regulatory levels in the test samples. Contaminant profiles from the 2022 study are similar to the previous year's data however the concentration ranges for the analytes were lower for trace elements and PAHs.

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We are the government's marine and freshwater science experts. We help keep our seas, oceans and rivers healthy and productive and our seafood safe and sustainable by providing data and advice to the UK Government and our overseas partners. We are passionate about what we do because our work helps tackle the serious global problems of climate change, marine litter, over-fishing and pollution in support of the UK's commitments to a better future (for example the UN Sustainable Development Goals and Defra's 25 year Environment Plan).

We work in partnership with our colleagues in Defra and across UK government, and with international governments, business, maritime and fishing industry, non-governmental organisations, research institutes, universities, civil society and schools to collate and share knowledge. Together we can understand and value our seas to secure a sustainable blue future for us all and help create a greater place for living.

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