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Annual report on the results of the Biotoxin and Phytoplankton Official Control Monitoring Programmes for England & Wales - 2016

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Quality statement: This report is a compilation of the information included on the reports provided daily/weekly to the FSA and showing the results of the phytoplankton and toxin analyses undertaken on samples submitted by local authorities. All results were quality checked and approved prior to release to the FSA and the results compiled in this report have been further checked against a copy of the original reports held on a central database. Information relating to the origin of the samples (place (including co-ordinates), date and time of collection) is as provided by local authority staff and has not undergone verification checks by Cefas.

 The co-ordinates used to depict the location of the monitoring points are the default co-ordinates of the FSA sampling points.

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1. Summary

This report describes the results of the Official Control Biotoxin Monitoring Programme for England and Wales for the period 1st January to 31st December 2016.

The laboratory testing for biotoxins in shellfish and potentially harmful phytoplankton in water samples, the co-ordination of the programme and its logistics were conducted by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) on behalf of the Food Standards Agency (FSA), the central competent authority for food safety. The programme aimed at delivering the testing required for the statutory monitoring of marine biotoxins in shellfish from classified production and relaying areas in England and Wales, and for identification and enumeration of potentially harmful micro-algae in selected shellfish harvesting areas, as required by EC Regulations 854/2004, 882/2004 and 2074/2005.

In the reported period, 55 of the 58 classified English and Welsh harvesting and relaying areas were monitored (directly or indirectly[1]) from 81 inshore sampling locations (Figures 1 and 2), giving a coverage rate of 95%[2]. A total of 1303 inshore shellfish samples and 1086 phytoplankton samples were submitted for analyses by staff from 38 Local Authorities (LAs).

In addition to the samples collected from inshore classified production and relaying areas, samples of wild Pectenidae were collected from auction houses, dispatch centres and/or processing plants in 2016 for the purpose of wild pectenidae verification monitoring.
A total of 20 samples (consisting of 14 samples of whole king scallops and 6 processed products) were submitted by 4 LAs.

Table 1: Maximum permitted limits of toxins in shellfish flesh[3]

Toxin	Maximum Permitted Limits
ASP	Exceeding 20 mg [Domoic/epi-domoic acid]/kg [shellfish flesh]
LTs	Diarrhetic shellfish poisoning (DSP) toxins and pectenotoxins (PTX) together, exceeding 160µg [okadaic acid (OA) equivalents]/kg [shellfish flesh] or Yessotoxins, exceeding 3.75mg [yessotoxin (YTX) equivalents]/kg [shellfish flesh] or Azaspiracids, exceeding 160µg [azaspiracid (AZA) equivalents]/kg [shellfish flesh].
PSP	Exceeding 800µg [saxitoxin equivalents (STX di-HCl eq.)]/kg [shellfish flesh]

[1] In this case, the classified production areas were monitored by sampling adjacent areas where appropriate
[2] 5% of the classified production areas were commercially inactive during the reporting period and hence not monitored
[3] Regulation (EC) 853/2004

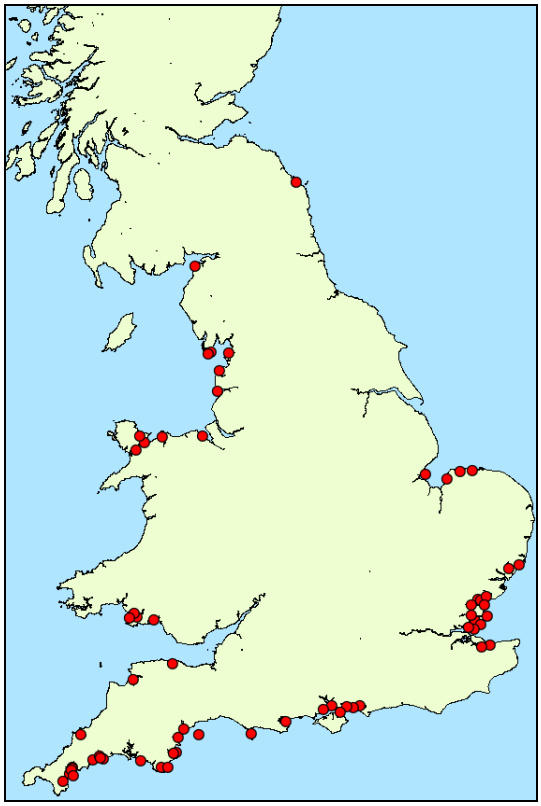


Figure 1. English and Welsh flesh sampling locations – 2016 Biotoxin monitoring programme

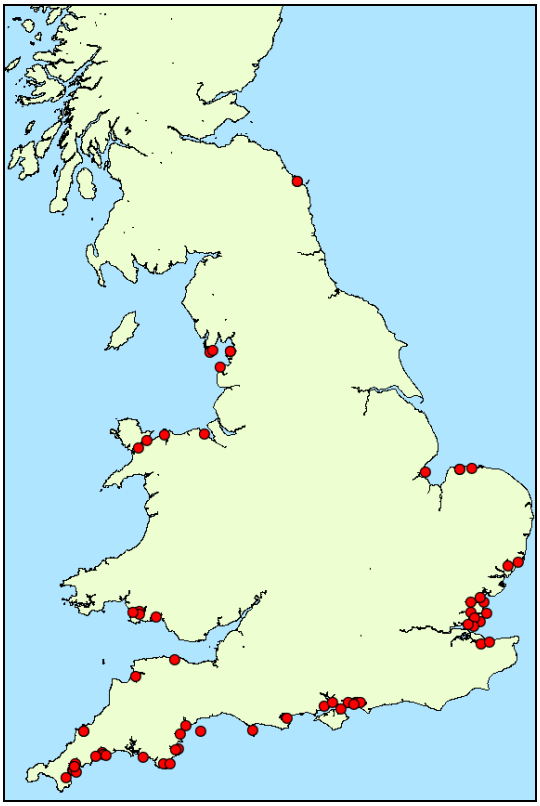


Figure 2. English and Welsh water sampling locations – 2016 Biotoxin monitoring programme

Results of the shellfish monitoring programme for the twelve-month period were as follows (all toxin results stated for Paralytic Shellfish Poisoning (PSP) toxins and Lipophilic Toxins (LTs) refer to the high value calculated from method uncertainty):

- **Amnesic Shellfish Poisoning (ASP) toxins - summary**

1178 inshore shellfish samples were tested for ASP toxins using a high performance liquid chromatography (HPLC) method. ASP toxins were detected in 22 samples from 12 production areas (Figure 3). The greatest proportion of samples containing ASP originated from the south-west of England (18 samples). The shellfish species affected included mussels (4 samples), Pacific oysters (14 samples) and surf clams (4 samples). None of the inshore shellfish samples tested for ASP exceeded the maximum permitted level (MPL) of 20 mg/kg in 2016. The highest ASP concentration was recorded in November (2.7 mg/kg) from the Start Bay production area.

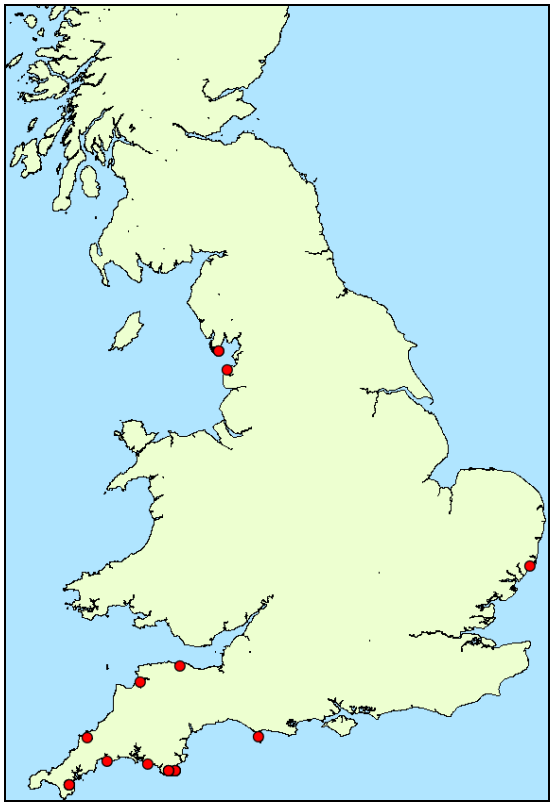


Figure 3: Location of classified production and/or relaying areas where ASP toxins were detected in 2016 (all below the MPL (20 mg [domoic+*epi*-domoic acid]/kg [shellfish tissue])

Nineteen samples of king scallops were analysed for ASP toxins, comprising 14 whole shellfish samples and 5 samples which had been shucked prior to submission to the laboratory (pre-shucked). Of the 14 whole king scallop samples, 14 contained ASP toxins, with 4 exceeding the MPL (see Figure 4). All samples which exceeded the MPL were collected by LAs along the south west coast of England (Cornwall to Dorset). Where ASP toxins were detected in whole scallop samples, concentrations ranged from 1.7 to 87 mg/kg. Results peaked in January 2016. Of the 5 pre-shucked samples, 2 contained low levels of ASP toxins, ranging from 1.7 to 2.4 mg/kg.

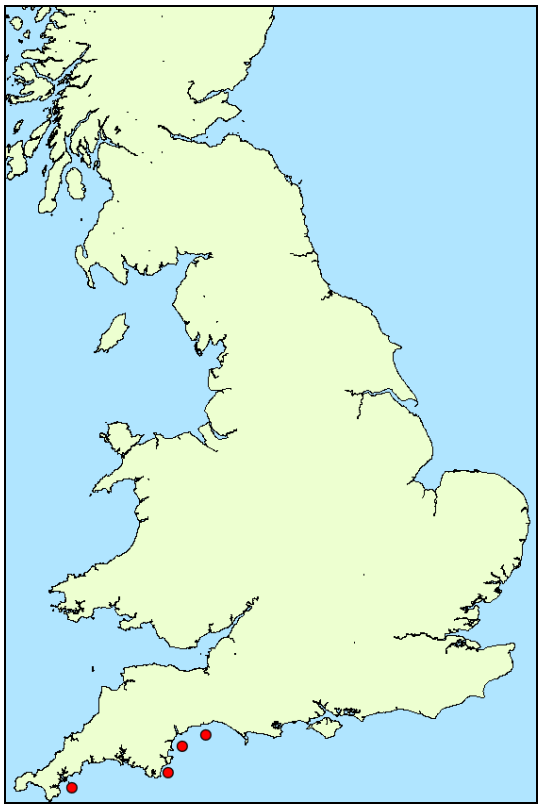


Figure 4: Approximate origin of wild pectenidae samples where ASP toxins were detected above the MPL (20 mg [domoic+*epi*-domoic acid]/kg [shellfish tissue]) in 2016

- **Paralytic Shellfish Poisoning (PSP) toxins - summary**

1228 inshore shellfish samples were screened for PSP toxins using the HPLC semi-quantitative method, twelve samples also required analysis by the full quantitative method. This is an increase on the number and levels detected in 2014 and 2015, however, is still lower than detection rates recorded between 2010 and 2013. Seven samples in total recorded PSP toxin levels above the MPL (800µg STX di-HCl eq.)]/kg). These were from the Salcombe and Swansea production areas. Ten samples in total recorded PSP toxin levels above the trigger level (400µg STX di-HCl eq.)]/kg). These were from the Pont Pill, Geese Quarries and Queens Dock sampling points (Figure 5).

The Salcombe production area recorded four results above the MPL between 21/06/2016 and 20/07/2016. *Alexandrium* spp. was the predominant toxin producing algal genera in this area, it was first detected on 18/05/2016, prior to the first detection of PSP toxins above the MPL (2213 µg/kg) on 21/06/2016. *Alexandrium* continued to be detected in 15 further samples in this area through to 18/10/2016. The highest level of PSP toxins (2213 µg/kg) was recorded on 21/06/2016, toxin levels fluctuated following this peak but with an overall downward trend. A second consecutive sample recorded below MPL on 10/08/2016 and the site was allowed to reopen. Toxins continued to be detected below MPL through to 13/10/2016.

The Swansea Bay production area recorded three results above the MPL between 03/05/2016 and 16/05/2016. During this event *Alexandrium* was first detected on 12/04/2016, prior to the first detection of PSP toxins above the MPL (1023 µg/kg) on 03/05/2016. *Alexandrium* spp. were detected through to the 16/05/2016, the same date on which the last breach of the MPL was detected. The peak of the toxin event occurred on 11/05/2016 with a toxin level of 2528 µg/kg. Toxin levels rose sharply and quickly declined during late Spring. A second consecutive sample recorded below MPL on 25/05/2016 and the site was allowed to reopen. No PSP toxins were detected from this area for the remainder of the year. This was the first time that PSP toxins had been detected from this production area. However, monitoring within the enclosed dock has only occurred since September 2012, prior to this all monitoring occurred in Swansea Bay.

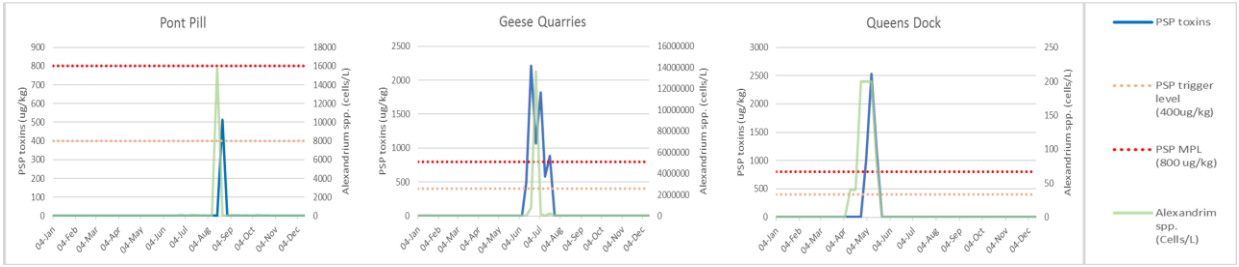


Figure 5. Sampling points where Paralytic Shellfish Toxins (Quantified high level (µg/kg)) exceeded the trigger level of 400 µg [STX eq.]/kg [shellfish flesh] in 2016

Eleven king scallop verification samples were analysed for PSP toxins (8 whole scallops and 3 pre-shucked samples). No samples required analysis by the quantitative method.

- **Lipophilic toxins (LTs) - summary**

A total of 1224 inshore samples were analysed for LTs using the Liquid Chromatography - tandem mass spectrometry (LC-MS/MS) method. The lipophilic toxins are sub-divided into three regulated groups.

Yessotoxins (YTXs)
Not detected in any samples received in 2016.

Azaspiracid group toxins (AZAs)
Detected in 14 inshore samples, all from the south Cornish coast (Figure 6). The samples were from Lantivet Bay, St. Austell Bay and the Fowey production areas and contained AZAs below the MPL, with results ranging from 24 to 98 µg AZA1 eq/kg between September and November 2016.

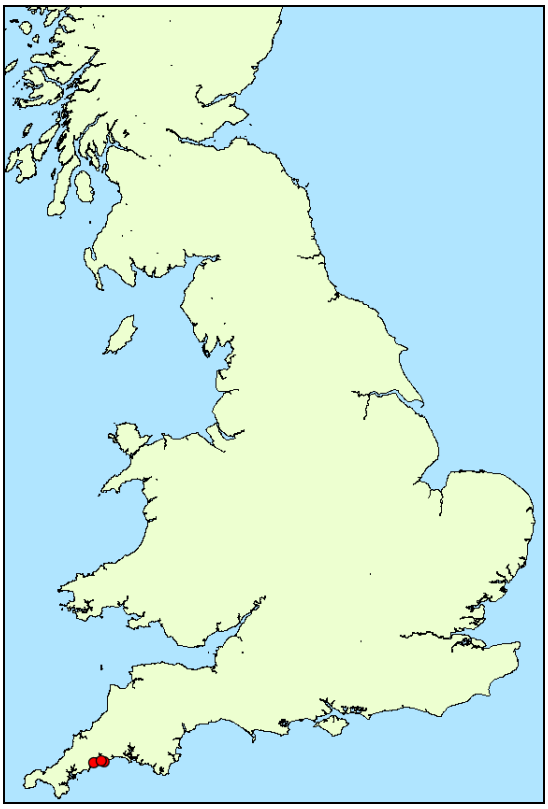


Figure 6: Location of classified production and/or relaying areas where AZAs group toxins were detected below the MPL of 160 µg [AZA1 equivalent]/kg [shellfish tissue] in 2016

Okadaic Acid/Dinophysistoxins/Pectenotoxins (OA/DTX/PTX)

Detected in 191 samples from 21 production areas (Figure 7). This is the highest number of recorded instances of this toxin group in inshore shellfish samples since the LC-MS/MS method was introduced in 2011. Seventy-one mussel samples from six production areas contained OA/DTX/PTXs above the MPL (set at 160 µg OA eq/kg) (Table 1 & Figure 8). Ninety-seven samples from eleven sampling points contained OA/DTX/PTXs above the trigger level (set at 80 µg OA eq/kg). The pattern of OA/DTX/PTX detection throughout 2016 can be observed in Figure 9 for these eleven sampling points. Thirteen other sampling points detected OA/DTX/PTXs below the trigger level in 2016.

The St. Austell Bay production area recorded 17 results above the MPL between 05/07/2016 and 24/10/2016. *Dinophysiaceae,* the predominant toxin producing algal genera in this area, were detected in a water sample on the 28/06/2016, prior to the detection of OA/DTX/PTX group toxins above the MPL (164 µg/kg) on 05/07/2016. *Dinophysiaceae* continued to be detected until 13/09/2016 with the exception of one sample on 18/07/2016. Toxin concentrations reached a peak on 17/08/2016 of 2,013 µg/kg. Toxin levels subsequently fluctuated over the following weeks but a general decreasing trend was observed. It was not until a sample collected on the 02/11/2016 that the site recorded a second consecutive result below the MPL and was allowed to reopen. Toxins continued to be detected in this production area until the end of December 2016. The initial detection of this toxin group occurred earlier than in the previous year although in 2016 the MPL was exceeded later and similarly the occurrence of toxins has continued to the end of the reporting period. The peak concentration recorded in 2016 was lower than that recorded in 2015 (3277 µg/kg), but occurred in early August in both cases.

The Fowey production area (adjacent to the St. Austell Bay area) recorded nineteen results above the MPL from two separate mussel monitoring points (Wisemans and Pont Pill) between 01/08/2016 and 14/11/2016. The highest concentration recorded during this event was from a sample collected on 31/08/2016 (978 µg/kg) from Pont Pill. Closures for this toxin group occurred at a similar time in 2015, although peak concentrations and the number of results above the MPL were higher in 2016. Of the two monitoring sites in the Fowey production area (Wisemans and Pont Pill) it is Pont Pill that has recorded the highest concentrations and the longest period of toxin occurrence in 2015 and 2016.

Lantivet Bay (also adjacent to St. Austell Bay and Fowey production areas) was a new production area in 2015. From 01/06/2016, *Dinophysiaceae* were detected consistently in water samples, with OA/DTX/PTX group toxins exceeding the MPL from 18/07/2016 to the 24/10/2016. In total, fourteen samples exceeded the MPL with the highest concentration (1043 µg/kg) recorded on 17/08/2016.

The Taw/Torridge production area recorded eight consecutive results above the MPL in samples collected between 20/07/2016 and 12/09/2016. The highest concentration during this event was recorded in a sample collected on 08/08/2016 (981 µg/kg). The second consecutive result below the MPL was recorded in a sample collected on 25/09/2016. This toxin group continued to be detected in this production area until the

end of the reporting period for 2016. This toxin group appeared at a similar time in 2015, although peak concentrations and the number of results above the MPL were higher in 2016.

The Lyme Bay production area recorded ten consecutive results above the MPL in samples collected between 25/07/2016 and 28/09/2016. The highest concentration during this event was recorded in a sample collected on 30/08/2016 (718 µg/kg). The second consecutive result below the MPL was recorded in a sample collected on 17/10/2016. This toxin group continued to be detected until mid-November. This toxin group appeared at a similar time in 2015, although peak concentrations and the number of results above the MPL were higher in 2016.

The Brixham production area recorded three consecutive results above the MPL in samples collected between 31/08/2016 and 12/09/2016. The highest concentration during this event was recorded in a sample collected on 31/08/2016 (278 µg/kg). The second consecutive result below the MPL was recorded in a sample collected on 26/09/2016, this was also the last occasion this toxin group was detected in 2016. This toxin group appeared at a similar time in 2015, although no samples exceeded the MPL in 2015.

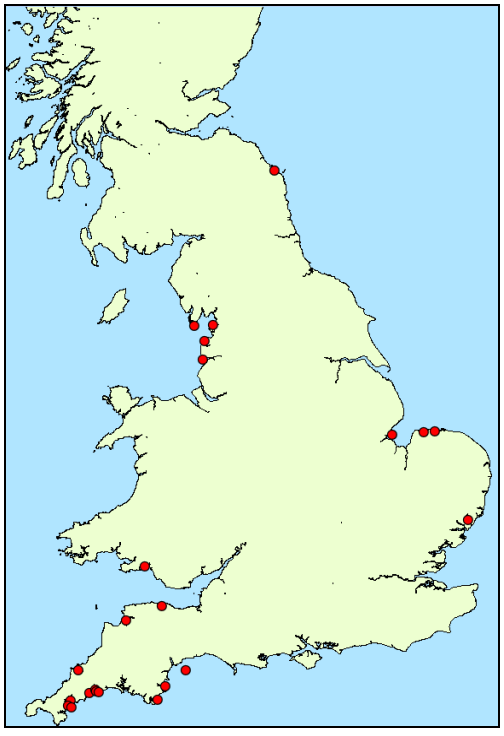


Figure 7: Location of classified production and/or relaying areas where OA/DTXs/PTXs group toxins were detected <u>below</u> the MPL of 160 µg [OA equivalent]/kg [shellfish tissue] in 2016

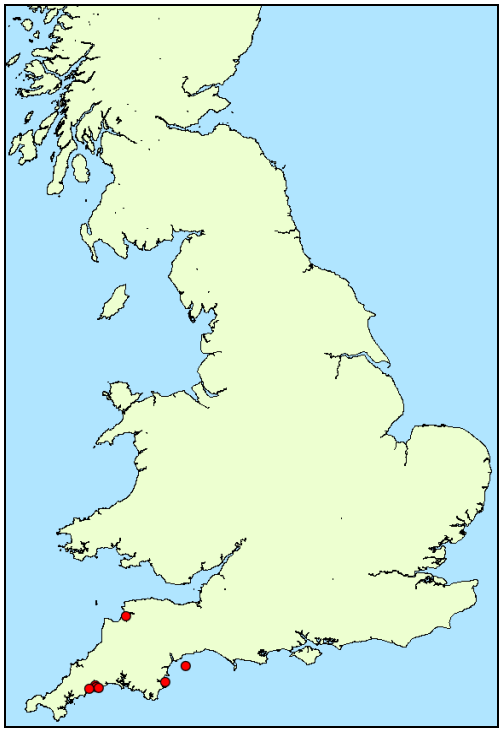


Figure 8: Location of classified production and relaying areas where OA/DTXs/PTXs group toxins were detected <u>above</u> the MPL of 160 µg [OA equivalent]/kg [shellfish tissue] in 2016

Eleven king scallop verification samples were analysed for LT toxins (8 whole scallops and 3 shucked samples). No lipophilic toxins were detected in any of the king scallop samples.

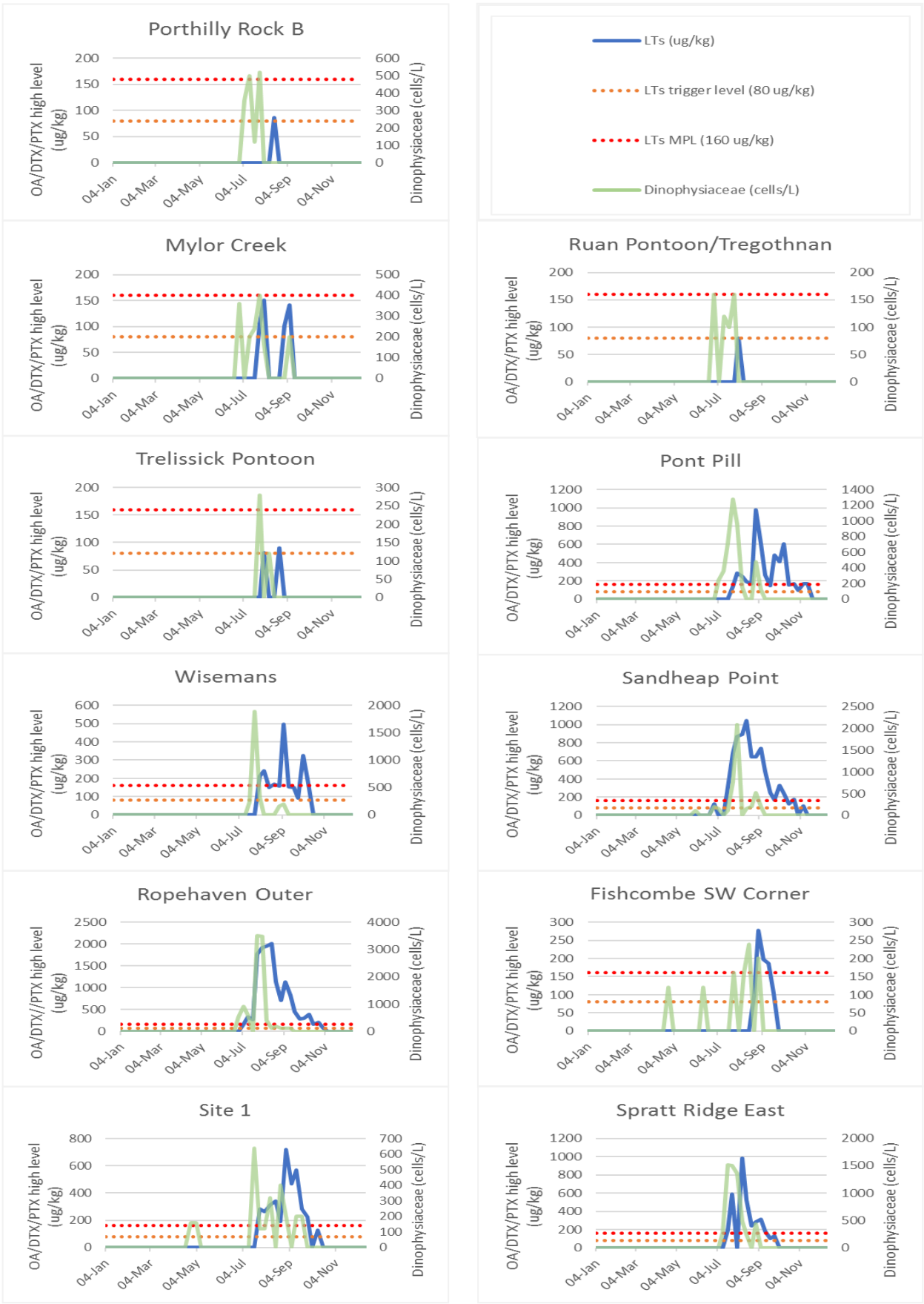


Figure 9. Sampling points where Lipophilic toxins (OA/DTX/PTX high level (µg/kg)) exceeded the trigger level of 80 µg [OA eq.]/kg [shellfish flesh] in 2016.

Table 2: Summary of sites where either ASP, PSP or lipophilic toxins were detected above the maximum permitted limits in 2016.

Toxin	Samples where toxin levels exceeded the maximum permitted level (ASP: > 20 mg [domoic +*epi*-domoic acid]/kg [shellfish flesh]; OA/DTXs/PTXs: >160 µg [OA eq.]/kg [shellfish flesh]; AZAs: >160 µg [AZA1 eq.]/kg [shellfish flesh]; YTXs: >3.75 mg [YTX eq.]/kg [shellfish flesh]; PSP: > 800 µg [STX eq.]/kg [shellfish flesh])			
	Local Authority	**Production area & site**	**Date samples collected**	**Highest value reported (Shellfish species)**
ASP	None	None	None	None
OA/DTXs/ PTXs	Cornwall PHA	St. Austell Bay: Ropehaven Outer	05/07/2016 to 24/10/2016 (17 samples over this period)	2013 µg/kg (Mussels)
		Fowey: Pont Pill	01/08/2016 to 13/09/2016 (7 samples over this period), 27/09/2016 to 10/10/2016 (3 samples over this period), 24/10/2016 & 07, 14/11/2016	978 µg/kg (Mussels)
		Fowey: Wisemans	01, 08, 24/08/2016, 06/09/2016, 03, 10/10/2016	495 µg/kg (Mussels)
		Lantivet Bay: Sandheap Point	18/07/2016 to 10/10/2016 (13 samples over this period), 24/10/2016	1043 µg/kg (Mussels)
	Torridge DC	Taw/Torridge: Spratt Ridge East	20/07/2016 to 12/09/2016 (8 samples during this period)	981 µg/kg (Mussels)
	Torbay BC	Brixham: Fishcombe SW corner	31/08/2016 to 12/09/2016 (3 samples over this period)	278 µg/kg (Mussels)
	Torbay BC	Lyme Bay: Site 1	25/07/2016 to 28/09/2016 (10 samples over this period)	718 µg/kg (Mussels)
AZAs	None	None	None	None
YTXs	None	None	None	None
PSP	South Hams DC	Salcombe: Geese Quarries	21/06/2016 to 06/07/2016 & 20/07/2016	2213 µg/kg (Pacific Oysters)
	Swansea PHA	Swansea: Queen's Dock	03/05/2016 to 16/05/2016	2528 µg/kg (Mussels)

- **Insufficient/unsuitable samples**

Seven shellfish samples (0.5% of all samples submitted) were not tested during the reported period for various reasons including sample quality, origin and/or frequency of submission.

Phytoplankton monitoring - summary

The results of the phytoplankton monitoring of classified production and relaying areas in England and Wales for 2016 are summarised below. Where the stated trigger levels (see Appendix 2, Table 1) were exceeded, additional flesh and water samples were requested the following week.

- *Alexandrium* species (PSP toxins producers) were recorded in 107 samples from 25 production areas (Table 3, Figure 10), representing an increase in the occurrence of this genus compared to the previous three years. Recorded maximum cell densities were also greater than over the previous three years, with densities >100,000 cells/L recorded in four samples from Salcombe: Geese Quarries (maximum density 13,617,000 cells/L). These levels are comparable to those recorded over the period 2006 to 2012, when annual recorded occurrences exceeded 80 samples, and maximum cell densities exceeded 100,000 cells/L in each year. In contrast, from 2013 to 2015, annual recorded occurrences did not exceed 55 samples, and maximum recorded cell densities did not exceed 27,000 cells/L.

- *Pseudo-nitzschia* (ASP toxin producer) were recorded in 683 samples from 48 production areas. The trigger level (set at 150,000 cells/L) was exceeded on 27 occasions from 15 production areas (Table 3, Figure 11). The highest cell density was recorded in a sample from Exe: Cockwood Harbour collected on 22 June (2,868,000 cells/L). The number of samples which exceed the trigger level for *Pseudo-nitzschia* has fluctuated considerably from year to year, ranging from 4 to 33 breaches per year since 2006. The 27 breaches recorded in 2016 represents the second highest annual number since 2006.

- Dinophysiaceae (lipophilic toxins producers) were recorded in 181 samples from 28 production areas. The trigger level (set at 100 cells/L) was exceeded by 106 samples from 23 production areas (Table 3, Figure 12). This is a notable increase (125.5%) in the number of Dinophysiaceae trigger level breaches compared to 2015, and is the greatest annual number for England and Wales since 2006. The last four years have seen a relatively high number of breaches (ranging from 39 to 106 per year) compared to the preceding eight years, which ranged from 4 to 32 per year. The maximum cell density recorded in 2016 was 3,920 cells/L from Percuil in Cornwall. Over the past twelve years, the recorded cell density of Dinophysiaceae blooms in England and Wales has not exceeded 7,000 cells/L.

- *Prorocentrum lima* (lipophilic toxins producers) were detected in 11 samples from 7 production areas (Table 3, Figure 13). The trigger level (set at 100 cells/L) was exceeded by just 2 samples, both from Holy Island: Ross Links. Cells were recorded at relatively low densities (100 cells/L in both samples). Since 2006, the number of *P. lima* breaches has ranged from 1 to 15 per year, with no obvious trend. *Prorocentrum lima* is considered a benthic species, and it is likely that its detection in the water column is associated with turbidity events.

Table 3. Summary of Phytoplankton taxa with trigger levels

Taxa with trigger levels (cells/L)	2016 Occurrences	2016 Breaches	% change in breach numbers compared to 2015	2016 max. recorded density (cells/L)
Alexandrium (presence)	107	107	+94.5%	13,617,000
Pseudo-nitzschia (150,000)	638	27	+170.0%	2,868,000
Dinophysiaceae (100)	181	106	+125.5%	3,920
Prorocentrum lima (100)	11	2	+100.0%	100

- *Prorocentrum cordatum* were recorded in 74 samples from 27 production areas. These figures are on a par with those recorded in 2015. Cell densities peaked in June at just 3600 cell/L.
- *Lingulodinium polyedrum* were recorded in 4 samples, all from Morecambe Bay - Barrow: Roa Island. The maximum recorded cell density was just 560 cells/L.
- *Protoceratium reticulatum* were recorded in a single sample from Morecambe Bay - Barrow: Roa Island. Both *P. reticulatum* and *L. polyedrum* have typically been recorded at relatively low frequencies in samples from English and Welsh shellfish production areas over the last twelve years.

Of the 1086 phytoplankton samples submitted in 2016, 2.39% (n=26) were rejected for analysis, 19 due to high sediment. This is a reduction of 1.25% in the number of high sediment samples compared to 2015, and is the lowest number of since 2006. A further 7 samples were not analysed for various reasons including incorrect frequency of submission or incorrect sampling method.

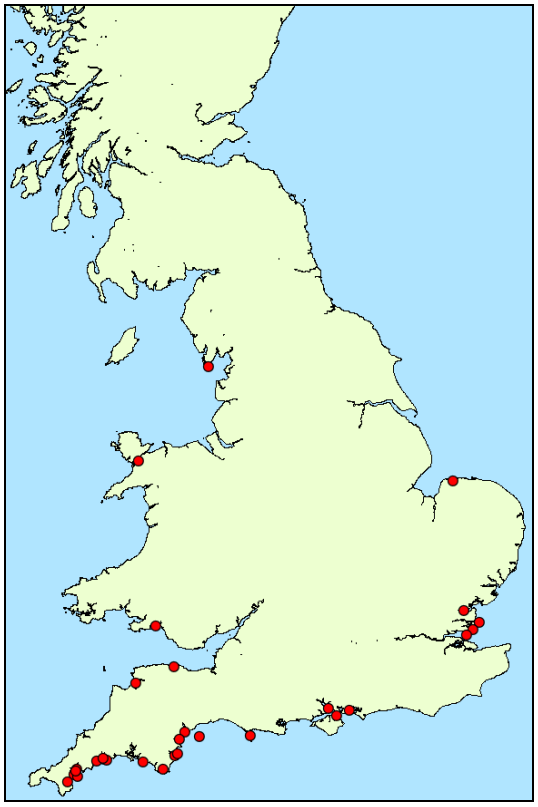


Figure 10: Locations of sites where *Alexandrium* species were detected above trigger level in 2016

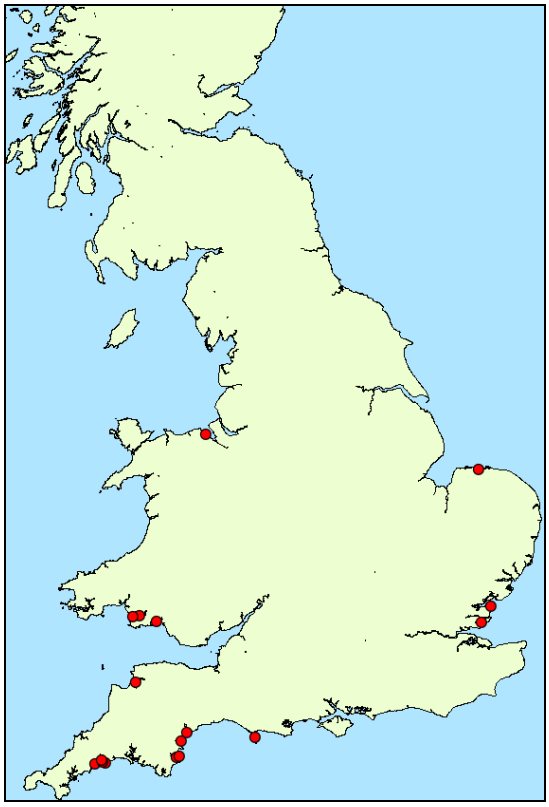


Figure 11: Locations of sites where *Pseudo – nitzschia* species were detected above trigger level in 2016

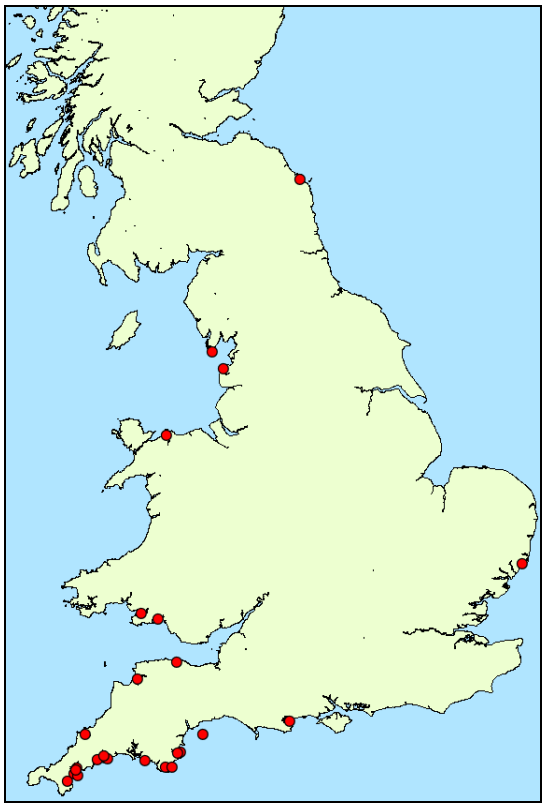


Figure 12: Locations of sites where *Dinophysiaceae* were detected above trigger level in 2016

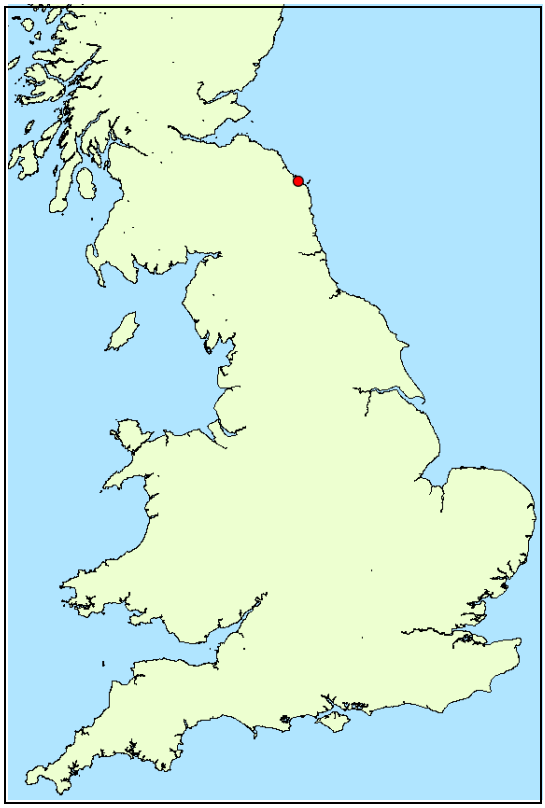


Figure 13: Locations of sites where *Prorocentrum lima* was detected above trigger level in 2016

2. Biotoxin sample results in 2016

2.1. Lipophilic Toxins, *Dinophysiaceae* and *Prorocentrum lima*

Table 4. Summary of results for samples recording Lipophilic toxins; Okadaic acid (OA), Dinophysistoxins (DTXs) and Pectenotoxins (PTXs), above the trigger level of 80 µg OA eq/kg. The table also includes samples recording the LTs causative algal species (Dinophysiaceae and *Prorocentrum lima*), above the trigger level of 100 cells/L. Results ordered by Local Authority. (Please note; toxin and algal results are only shown when the trigger levels have been breached).

Production Area	Bed ID	Local Authority	Sampling Point	Date sample collected	OA/DTX/PTX high level (µg/kg)	Dinophysiaceae (cells/L)	Prorocentrum lima (cells/L)
Morecambe Bay	B077Q	Barrow-in-Furness BC	Roa Island	05/04/2016		120	
Burry Inlet	B038D	Carmarthenshire CC	Machynys	24/05/2016		200	
Burry Inlet	B038D	Carmarthenshire CC	Machynys	01/06/2016		100	
Burry Inlet	B038D	Carmarthenshire CC	Machynys	14/06/2016		400	
Conwy	B044V	Conwy CBC	Conwy West	06/09/2016		100	
Camel	B35AE	Cornwall CC	Porthilly Rock B	06/07/2016		360	
Camel	B35AE	Cornwall CC	Porthilly Rock B	11/07/2016		500	
Camel	B35AE	Cornwall CC	Porthilly Rock B	20/07/2016		120	
Camel	B35AE	Cornwall CC	Porthilly Rock B	25/07/2016		520	
Camel	B35AE	Cornwall CC	Porthilly Rock B	16/08/2016	87		
Fal	B33AN	Cornwall PHA	Mylor Creek	28/06/2016		360	
Fal	B33AN	Cornwall PHA	Mylor Creek	12/07/2016		200	
Fal	B33AN	Cornwall PHA	Mylor Creek	19/07/2016		240	
Fal	B33AN	Cornwall PHA	Mylor Creek	26/07/2016		400	
Fal	B33AN	Cornwall PHA	Mylor Creek	26/07/2016	107		
Fal	B33AN	Cornwall PHA	Mylor Creek	03/08/2016		160	
Fal	B33AN	Cornwall PHA	Mylor Creek	03/08/2016	151		
Fal	B33AN	Cornwall PHA	Mylor Creek	30/08/2016	102		
Fal	B33AN	Cornwall PHA	Mylor Creek	07/09/2016		200	
Fal	B33AN	Cornwall PHA	Mylor Creek	07/09/2016	141		
Fal	B033Y	Cornwall PHA	Ruan Pontoon/ Tregothnan	28/06/2016		160	
Fal	B033Y	Cornwall PHA	Ruan Pontoon/ Tregothnan	12/07/2016		120	
Fal	B033Y	Cornwall PHA	Ruan Pontoon/ Tregothnan	19/07/2016		100	
Fal	B033Y	Cornwall PHA	Ruan Pontoon/ Tregothnan	26/07/2016		160	
Fal	B033Y	Cornwall PHA	Ruan Pontoon/ Tregothnan	03/08/2016	80		
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	26/07/2016		280	
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	03/08/2016	82		

Fal	B33BD	Cornwall PHA	Trelissick Pontoon	09/08/2016		120
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	23/08/2016	90	
Fowey	B70AB	Cornwall PHA	Pont Pill	05/07/2016		240
Fowey	B70AB	Cornwall PHA	Pont Pill	12/07/2016		360
Fowey	B70AB	Cornwall PHA	Pont Pill	18/07/2016		720
Fowey	B70AB	Cornwall PHA	Pont Pill	25/07/2016		1280
Fowey	B70AB	Cornwall PHA	Pont Pill	25/07/2016	142	
Fowey	B70AB	Cornwall PHA	Pont Pill	01/08/2016		960
Fowey	B70AB	Cornwall PHA	Pont Pill	01/08/2016	289	
Fowey	B70AB	Cornwall PHA	Pont Pill	08/08/2016		160
Fowey	B70AB	Cornwall PHA	Pont Pill	08/08/2016	248	
Fowey	B70AB	Cornwall PHA	Pont Pill	17/08/2016	195	
Fowey	B70AB	Cornwall PHA	Pont Pill	24/08/2016	168	
Fowey	B70AB	Cornwall PHA	Pont Pill	31/08/2016		480
Fowey	B70AB	Cornwall PHA	Pont Pill	31/08/2016	978	
Fowey	B70AB	Cornwall PHA	Pont Pill	06/09/2016		120
Fowey	B70AB	Cornwall PHA	Pont Pill	06/09/2016	606	
Fowey	B70AB	Cornwall PHA	Pont Pill	13/09/2016	262	
Fowey	B70AB	Cornwall PHA	Pont Pill	19/09/2016	151	
Fowey	B70AB	Cornwall PHA	Pont Pill	27/09/2016	485	
Fowey	B70AB	Cornwall PHA	Pont Pill	03/10/2016	412	
Fowey	B70AB	Cornwall PHA	Pont Pill	10/10/2016	608	
Fowey	B70AB	Cornwall PHA	Pont Pill	17/10/2016	156	
Fowey	B70AB	Cornwall PHA	Pont Pill	24/10/2016	171	
Fowey	B70AB	Cornwall PHA	Pont Pill	31/10/2016	99	
Fowey	B70AB	Cornwall PHA	Pont Pill	07/11/2016	168	
Fowey	B70AB	Cornwall PHA	Pont Pill	14/11/2016	167	
Fowey	B70AA	Cornwall PHA	Wisemans	18/07/2016		240
Fowey	B70AA	Cornwall PHA	Wisemans	25/07/2016		1880
Fowey	B70AA	Cornwall PHA	Wisemans	01/08/2016		320
Fowey	B070Z	Cornwall PHA	Wisemans	01/08/2016	214	
Fowey	B070Z	Cornwall PHA	Wisemans	08/08/2016	241	
Fowey	B070Z	Cornwall PHA	Wisemans	17/08/2016	151	
Fowey	B070Z	Cornwall PHA	Wisemans	24/08/2016	168	
Fowey	B70AA	Cornwall PHA	Wisemans	31/08/2016		160
Fowey	B070Z	Cornwall PHA	Wisemans	31/08/2016	158	
Fowey	B70AA	Cornwall PHA	Wisemans	06/09/2016		200
Fowey	B070Z	Cornwall PHA	Wisemans	06/09/2016	495	
Fowey	B070Z	Cornwall PHA	Wisemans	13/09/2016	153	
Fowey	B070Z	Cornwall PHA	Wisemans	19/09/2016	152	
Fowey	B070Z	Cornwall PHA	Wisemans	27/09/2016	92	
Fowey	B070Z	Cornwall PHA	Wisemans	03/10/2016	326	
Fowey	B070Z	Cornwall PHA	Wisemans	10/10/2016	171	
Helford	B034W	Cornwall PHA	Porth Navas Quay	06/06/2016		100

Helford	B034W	Cornwall PHA	Porth Navas Quay	13/06/2016		100
Helford	B034W	Cornwall PHA	Porth Navas Quay	20/06/2016		200
Helford	B034W	Cornwall PHA	Porth Navas Quay	29/06/2016		200
Helford	B034W	Cornwall PHA	Porth Navas Quay	04/07/2016		160
Helford	B034W	Cornwall PHA	Porth Navas Quay	11/07/2016		160
Helford	B034W	Cornwall PHA	Porth Navas Quay	18/07/2016		200
Helford	B034W	Cornwall PHA	Porth Navas Quay	05/09/2016		280
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	01/06/2016		120
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	28/06/2016		200
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	28/06/2016	128	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	05/07/2016		160
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	18/07/2016		120
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	18/07/2016	310	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	25/07/2016		760
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	25/07/2016	689	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	01/08/2016		2080
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	01/08/2016	866	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	08/08/2016	891	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	17/08/2016		160
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	17/08/2016	1043	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	24/08/2016		200
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	24/08/2016	647	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	31/08/2016		520
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	31/08/2016	646	
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	06/09/2016		200
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	06/09/2016	741	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	13/09/2016	484	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	19/09/2016	248	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	27/09/2016	169	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	03/10/2016	331	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	10/10/2016	243	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	17/10/2016	126	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	24/10/2016	179	
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	07/11/2016	104	
Percuil	B033R	Cornwall PHA	Percuil	28/06/2016		440
Percuil	B033R	Cornwall PHA	Percuil	06/07/2016		160
Percuil	B033R	Cornwall PHA	Percuil	12/07/2016		160
Percuil	B033R	Cornwall PHA	Percuil	26/07/2016		880
Percuil	B033R	Cornwall PHA	Percuil	03/08/2016		3920
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	28/06/2016		520
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	05/07/2016		920
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	05/07/2016	164	

St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	12/07/2016		600	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	12/07/2016	334		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	18/07/2016	273		
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	25/07/2016		3520	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	25/07/2016	1778		
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	01/08/2016		3480	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	01/08/2016	1920		
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	08/08/2016		400	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	08/08/2016	1949		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	17/08/2016		120	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	17/08/2016	2013		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	24/08/2016		200	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	24/08/2016	1133		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	31/08/2016		120	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	31/08/2016	713		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	06/09/2016		120	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	06/09/2016	1129		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	13/09/2016		120	
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	13/09/2016	824		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	19/09/2016	455		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	27/09/2016	287		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	03/10/2016	297		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	10/10/2016	396		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	17/10/2016	166		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	24/10/2016	208		
St. Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	31/10/2016	85		
Holy Island	B001M	Northumberland CC	Ross Links	30/05/2016			100
Holy Island	B001M	Northumberland CC	Ross Links	04/07/2016		320	
Holy Island	B001M	Northumberland CC	Ross Links	20/09/2016		100	100
Yealm	B031F	Plymouth PHA	Thorn	20/07/2016		120	
Yealm	B031F	Plymouth PHA	Thorn	01/08/2016		120	
Poole	B54CL	Poole BC	West Brownsea 1	07/06/2016		100	
Salcombe	B029D	South Hams DC	Geese Quarries	08/08/2016		120	
Start Bay	B087J	South Hams DC	Off Torcross	22/08/2016		120	

Dart	B028B	South Hams DC	Waddeton	21/06/2016		200
Dart	B028B	South Hams DC	Waddeton	17/08/2016		300
Butley	B009E	Suffolk Coastal DC	Pumping Station Outfall	13/06/2016		100
Swansea	B037U	Swansea PHA	Queens Dock	26/07/2016		880
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	26/04/2016		120
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	14/06/2016		120
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	26/07/2016		160
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	10/08/2016		160
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	15/08/2016		240
Brixham	B082B	Torbay BC	Fishcombe SW corner	23/08/2016	99	
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	31/08/2016		200
Brixham	B082B	Torbay BC	Fishcombe SW corner	31/08/2016	278	
Brixham	B082B	Torbay BC	Fishcombe SW corner	05/09/2016	197	
Brixham	B082B	Torbay BC	Fishcombe SW corner	12/09/2016	186	
Brixham	B082B	Torbay BC	Fishcombe SW corner	19/09/2016	104	
Lyme Bay	B090M	Torbay BC	Site 1	26/04/2016		160
Lyme Bay	B090M	Torbay BC	Site 1	04/05/2016		160
Lyme Bay	B090M	Torbay BC	Site 1	20/07/2016		640
Lyme Bay	B090M	Torbay BC	Site 1	25/07/2016		120
Lyme Bay	B090M	Torbay BC	Site 1	25/07/2016	283	
Lyme Bay	B090M	Torbay BC	Site 1	03/08/2016		120
Lyme Bay	B090M	Torbay BC	Site 1	03/08/2016	262	
Lyme Bay	B090M	Torbay BC	Site 1	08/08/2016		320
Lyme Bay	B090M	Torbay BC	Site 1	08/08/2016	313	
Lyme Bay	B090M	Torbay BC	Site 1	15/08/2016	343	
Lyme Bay	B090M	Torbay BC	Site 1	23/08/2016		400
Lyme Bay	B090M	Torbay BC	Site 1	23/08/2016	193	
Lyme Bay	B090M	Torbay BC	Site 1	30/08/2016		200
Lyme Bay	B090M	Torbay BC	Site 1	30/08/2016	718	
Lyme Bay	B090M	Torbay BC	Site 1	05/09/2016	469	
Lyme Bay	B090M	Torbay BC	Site 1	13/09/2016		200
Lyme Bay	B090M	Torbay BC	Site 1	13/09/2016	572	
Lyme Bay	B090M	Torbay BC	Site 1	19/09/2016		200
Lyme Bay	B090M	Torbay BC	Site 1	19/09/2016	282	
Lyme Bay	B090M	Torbay BC	Site 1	28/09/2016	223	
Lyme Bay	B090M	Torbay BC	Site 1	10/10/2016	129	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	11/07/2016		280
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge	20/07/2016		1520

			East			
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	20/07/2016	195	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	26/07/2016		1500
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	27/07/2016	592	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	01/08/2016		1360
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	08/08/2016	981	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	09/08/2016		480
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	15/08/2016		240
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	16/08/2016	525	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	24/08/2016	237	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	30/08/2016		440
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	31/08/2016	285	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	05/09/2016	313	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	12/09/2016	181	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	19/09/2016	104	
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	25/09/2016	128	
Porlock	B094D	West Somerset	Porlock East	12/12/2016		200
Lune	B066Y	Wyre BC	Sea Centre South	11/07/2016		200
Lune	B066Y	Wyre BC	Sea Centre South	05/09/2016		200
Lune	B066Y	Wyre BC	Sea Centre South	14/09/2016		200

Table colour coding: Yellow (above toxin trigger level), Red (above toxin MPL), Green (above primary causative algal species trigger level), Grey (above secondary causative algal species trigger level)

Table 5. Summary of results for samples recording Lipophilic toxin group Azaspiracids (AZAs) above the trigger level of 80 µg AZA1 eq/kg. Results ordered by Local Authority. (Please note; the causative algal species (*Azadinium spinosum*) is not monitored for in England and Wales).

Production Area	Local Authority	Sampling Point	Collection date	Species	Total AZAs (µg AZA1 eq/kg)
St. Austell Bay	Cornwall PHA	Ropehaven Outer	13/09/2016	M	98
St. Austell Bay	Cornwall PHA	Ropehaven Outer	19/09/2016	M	86

Table colour coding: Yellow (above toxin trigger level), Red (above toxin MPL)

No samples detected Yessotoxins (YTXs) above the trigger level of 1.875 mg YTX eq/kg during 2016.

2.2. Paralytic Shellfish Poisoning (PSP) and *Alexandrium* species

Table 6. Summary of PSP toxins and *Alexandrium* spp. detected above the trigger levels of 400 µg STXeq/kg and 40 cells/L respectively during 2016. Results ordered by Local Authority.

Production Area	Bed ID	Local Authority	Sampling Point	Date Sample Collected	PSP high level (µg/kg)	*Alexandrium* spp. (cells/L)
Morecambe Bay - Barrow	B077Q	Barrow-in-Furness BC	Roa Island	17/08/2016		120
Morecambe Bay - Barrow	B077Q	Barrow-in-Furness BC	Roa Island	20/09/2016		40
Fal	B33AN	Cornwall PHA	Mylor Creek	28/06/2016		40
Fal	B33AN	Cornwall PHA	Mylor Creek	12/07/2016		80
Fal	B33AN	Cornwall PHA	Mylor Creek	19/07/2016		80
Fal	B33AN	Cornwall PHA	Mylor Creek	26/07/2016		40
Fal	B33AN	Cornwall PHA	Mylor Creek	03/08/2016		40
Fal	B33AN	Cornwall PHA	Mylor Creek	09/08/2016		200
Fal	B33AN	Cornwall PHA	Mylor Creek	16/08/2016		120
Fal	B33AN	Cornwall PHA	Mylor Creek	23/08/2016		40
Percuil	B033R	Cornwall PHA	Percuil	14/06/2016		40
Percuil	B033R	Cornwall PHA	Percuil	21/06/2016		40
Percuil	B033R	Cornwall PHA	Percuil	26/07/2016		40
Percuil	B033R	Cornwall PHA	Percuil	23/08/2016		40
Percuil	B033R	Cornwall PHA	Percuil	13/09/2016		40
Fowey	B70AB	Cornwall PHA	Pont Pill	28/06/2016		80
Fowey	B70AB	Cornwall PHA	Pont Pill	12/07/2016		40
Fowey	B70AB	Cornwall PHA	Pont Pill	18/07/2016		40
Fowey	B70AB	Cornwall PHA	Pont Pill	17/08/2016		15760
Fowey	B70AB	Cornwall PHA	Pont Pill	24/08/2016		80
Fowey	B70AB	Cornwall PHA	Pont Pill	24/08/2016	512	
Fowey	B70AB	Cornwall PHA	Pont Pill	06/09/2016		40
Fowey	B70AB	Cornwall PHA	Pont Pill	13/09/2016		80
Fowey	B70AB	Cornwall PHA	Pont Pill	10/10/2016		40
Helford	B034W	Cornwall PHA	Porth Navas Quay	01/06/2016		200
Helford	B034W	Cornwall PHA	Porth Navas Quay	13/06/2016		100
Helford	B034W	Cornwall PHA	Porth Navas Quay	20/06/2016		800
Helford	B034W	Cornwall PHA	Porth Navas Quay	11/07/2016		40
Helford	B034W	Cornwall PHA	Porth Navas Quay	15/08/2016		100
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	12/07/2016		40
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	18/07/2016		720
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	28/06/2016		40
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	06/07/2016		40
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	12/07/2016		40
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	19/07/2016		200
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	26/07/2016		40
Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	09/08/2016		40

Fal	B033Y	Cornwall PHA	Ruan Pontoon/Tregothnan	16/08/2016		120
Lantivet Bay	B70AI	Cornwall PHA	Sandheap Point	13/06/2016		40
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	12/07/2016		40
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	18/07/2016		120
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	01/08/2016		40
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	26/07/2016		40
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	09/08/2016		80
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	16/08/2016		40
Fal	B33BD	Cornwall PHA	Trelissick Pontoon	23/08/2016		40
Fowey	B70AA	Cornwall PHA	Wisemans	01/08/2016		40
Fowey	B70AA	Cornwall PHA	Wisemans	08/08/2016		40
Fowey	B70AA	Cornwall PHA	Wisemans	17/08/2016		4120
Fowey	B70AA	Cornwall PHA	Wisemans	24/08/2016		280
Fowey	B70AA	Cornwall PHA	Wisemans	13/09/2016		360
Menai Strait West	B042O	Gwynedd CC	Area 11 East	12/07/2016		40
Brancaster	B005F	Kings Lynn & W Norfolk BC	Loose J	23/08/2016		40
The Thames	B16CM	London PHA	Crouch Approach	20/06/2016		80
The Thames	B16CN	London PHA	East of Havengore Creek	20/06/2016		40
The Thames	B16CN	London PHA	East of Havengore Creek	04/07/2016		80
The Thames	B16BR	London PHA	Phoenix	04/07/2016		80
Blackwater	B014V	Maldon DC	Goldhanger	21/06/2016		200
Yealm	B031F	Plymouth PHA	Thorn	08/06/2016		80
Yealm	B031J	Plymouth PHA	Thorn	16/06/2016		160
Yealm	B031F	Plymouth PHA	Thorn	20/07/2016		120
Yealm	B031F	Plymouth PHA	Thorn	17/08/2016		1280
Yealm	B031F	Plymouth PHA	Thorn	23/08/2016		80
Yealm	B031F	Plymouth PHA	Thorn	31/08/2016		5280
Yealm	B031F	Plymouth PHA	Thorn	07/09/2016		320
Yealm	B031F	Plymouth PHA	Thorn	15/09/2016		40
Langstone Harbour	B019I	Portsmouth PHA	Stoke Common Lake	04/07/2016		80
Salcombe	B029D	South Hams DC	Geese Quarries	18/05/2016		100
Salcombe	B029D	South Hams DC	Geese Quarries	23/05/2016		100
Salcombe	B029D	South Hams DC	Geese Quarries	02/06/2016		13300
Salcombe	B029D	South Hams DC	Geese Quarries	07/06/2016		600
Salcombe	B029D	South Hams DC	Geese Quarries	14/06/2016		400
Salcombe	B029D	South Hams DC	Geese Quarries	14/06/2016	493	
Salcombe	B029D	South Hams DC	Geese Quarries	21/06/2016		773000

Salcombe	B029D	South Hams DC	Geese Quarries	21/06/2016	2213	
Salcombe	B029D	South Hams DC	Geese Quarries	28/06/2016		13617000
Salcombe	B029D	South Hams DC	Geese Quarries	28/06/2016	1071	
Salcombe	B029D	South Hams DC	Geese Quarries	06/07/2016		162000
Salcombe	B029D	South Hams DC	Geese Quarries	06/07/2016	1817	
Salcombe	B029D	South Hams DC	Geese Quarries	13/07/2016		200
Salcombe	B029D	South Hams DC	Geese Quarries	13/07/2016	585	
Salcombe	B029D	South Hams DC	Geese Quarries	20/07/2016		200000
Salcombe	B029D	South Hams DC	Geese Quarries	20/07/2016	881	
Salcombe	B029D	South Hams DC	Geese Quarries	04/08/2016		700
Salcombe	B029D	South Hams DC	Geese Quarries	17/08/2016		1240
Salcombe	B029D	South Hams DC	Geese Quarries	22/08/2016		200
Salcombe	B029D	South Hams DC	Geese Quarries	07/09/2016		200
Salcombe	B029D	South Hams DC	Geese Quarries	18/10/2016		100
Dart	B028B	South Hams DC	Waddeton	18/05/2016		100
Dart	B028B	South Hams DC	Waddeton	07/06/2016		1800
Dart	B028B	South Hams DC	Waddeton	08/08/2016		40
Solent	B24BK	Southampton PHA	Browndown	04/07/2016		40
Southampton Water	B021Y	Southampton PHA	Hamble Estuary	16/05/2016		80
Southampton Water	B021Y	Southampton PHA	Hamble Estuary	04/07/2016		80
Swansea	B037U	Swansea PHA	Queens Dock	12/04/2016		40
Swansea	B037U	Swansea PHA	Queens Dock	19/04/2016		40
Swansea	B037U	Swansea PHA	Queens Dock	25/04/2016		200
Swansea	B037U	Swansea PHA	Queens Dock	03/05/2016		200
Swansea	B037U	Swansea PHA	Queens Dock	03/05/2016	1023	
Swansea	B037U	Swansea PHA	Queens Dock	11/05/2016		200
Swansea	B037U	Swansea PHA	Queens Dock	11/05/2016	2528	
Swansea	B037U	Swansea PHA	Queens Dock	16/05/2016		80
Swansea	B037U	Swansea PHA	Queens Dock	16/05/2016	1148	
Exe	B26BH	Teignbridge DC	Cockwood Harbour	07/06/2016		40
Teign	B27AC	Teignbridge DC	Gas Works East	07/06/2016		120
Teign	B27AC	Teignbridge DC	Gas Works East	22/06/2016		80
Teign	B27AC	Teignbridge DC	Gas Works East	11/07/2016		40
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	19/07/2016		160
Lyme Bay	B090M	Torbay BC	Site 1	26/05/2016		40
Lyme Bay	B090M	Torbay BC	Site 1	20/07/2016		40
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	24/05/2016		40
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	31/05/2016		120
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	07/06/2016		40

Porlock	B094D	West Somerset Council	Porlock East	12/12/2016	200
The Fleet	B25AI	Weymouth PHA	Fleet Oysters	25/04/2016	40
The Fleet	B25AI	Weymouth PHA	Fleet Oysters	16/08/2016	120
The Fleet	B25AI	Weymouth PHA	Fleet Oysters	11/10/2016	40

Table colour coding: Yellow (above toxin trigger level), Red (above toxin MPL), Green (above causative algae trigger level)

2.3. Amnesic Shellfish Poisoning (ASP) and *Pseudo-nitzschia* species

No samples recorded ASP toxins above the trigger level of 10µg/g.

Table 7. Summary of *Pseudo-nitzschia* species detected above the trigger level of 150,000 cells/L. Results ordered by Local Authority.

Production Area	Bed ID	Local Authority	Sampling Point	Sample Collection Method	Date Sample Collected	*Pseudo-nitzschia* spp. (cells/L)
Burry Inlet	B038D	Carmarthenshire CC	Machynys	Tube	24/05/2016	682000
Burry Inlet	B038D	Carmarthenshire CC	Machynys	Tube	01/06/2016	2116000
Burry Inlet	B038D	Carmarthenshire CC	Machynys	Tube	14/06/2016	1204000
Burry Inlet	B038T	City and Council of Swansea	Whitford Point	Surface	23/05/2016	346000
Fowey	B70AB	Cornwall PHA	Pont Pill	Pole	19/09/2016	207000
St Austell Bay	B70AE	Cornwall PHA	Ropehaven Outer	Pole	13/09/2016	204000
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	Pole	13/09/2016	230000
Lantivet Bay	B70AH	Cornwall PHA	Sandheap Point	Pole	19/09/2016	222000
Fowey	B70AA	Cornwall PHA	Wisemans	Pole	19/09/2016	290000
Dee	B45AB	Flintshire CC	Salisbury	Pole	21/06/2016	321600
Roach	B73AF	London PHA	Paglesham	Surface	15/08/2016	682000
Blackwater	B14AD	Maldon DC	St Peters Flats	Surface	17/08/2016	1407000
Blakeney	B006R	North Norfolk DC	Wells - The Pool	Pole	08/06/2016	152000
Blakeney	B006R	North Norfolk DC	Wells - The Pool	Pole	14/06/2016	237000
Dart	B028B	South Hams DC	Waddeton	Pole	21/06/2016	196800
Swansea	B037U	Swansea PHA	Queens Dock	Tube	08/06/2016	371000
Swansea	B037U	Swansea PHA	Queens Dock	Tube	28/06/2016	317000
Swansea	B037U	Swansea PHA	Queens Dock	Tube	05/07/2016	1383000
Exe	B26BH	Teignbridge DC	Cockwood Harbour	Pole	14/06/2016	1294000
Exe	B26BH	Teignbridge DC	Cockwood Harbour	Pole	22/06/2016	2868000
Teign	B27AC	Teignbridge DC	Gas Works East	Pole	14/06/2016	373000
Teign	B27AC	Teignbridge DC	Gas Works East	Pole	22/06/2016	1031000
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	Pole	14/06/2016	786000
Brixham	B082B	Torbay BC	Fishcombe Cove SW Corner	Pole	21/06/2016	219000

Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	Pole	16/05/2016	813000
Taw/Torridge	B36AB	Torridge DC	Spratt Ridge East	Pole	24/05/2016	209000
The Fleet	B25AI	Weymouth PHA	Fleet Oysters	Pole	20/06/2016	757000

Table colour coding: Green (above causative algae trigger level)

3. Results of the 2016 wild pectenidae verification programme

Samples of wild pectenidae were collected by 4 local authorities from auction houses, processing plants and/or dispatch centres. As the samples are not collected from designated monitoring points, information on the origin of the samples was taken from the shellfish movement document by the LA collecting the sample. Their approximate origins are indicated in Figure 14.

Samples were collected and submitted as either whole scallops or shucked product. (Please note; in the table below shucked product refers to samples consisting of adductor muscle and roe). Results are summarised in Table 9 below.

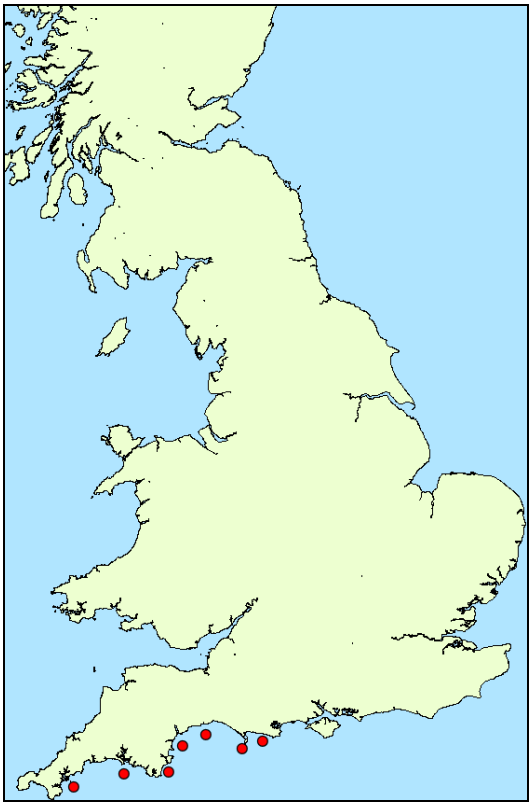


Figure 14: Approximate origins of wild pectenidae samples collected in 2016

Table 8. Results of the 2016 wild pectenidae verification programme (England & Wales)

Local Authority	Sample composition	No of samples submitted	No of unsuitable samples	PSP detected (>MPL)	OA/DTX/PTX group detected (> MPL)	AZA group detected (>MPL)	YTX group detected (>MPL)	ASP detected (>MPL)
Cornwall PHA	Whole	1	0	0	0	0	0	1
	Shucked	1	0	0	0	0	0	0
Plymouth PHA	Whole	1	0	0	0	0	0	0
	Shucked	1	0	0	0	0	0	0
Torbay BC	Whole	3	0	0	0	0	0	1
Weymouth PHA	Whole	9	0	0	0	0	0	2
	Shucked	4	1	0	0	0	0	0

4. Glossary

AOAC	AOAC International
ASP	Amnesic Shellfish Poisoning
AZA	Azaspiracid
AZP	Azaspiracid Poisoning
Cefas	The Centre for Environment, Fisheries and Aquaculture Sciences
DA	Domoic Acid
DSP	Diarrhetic Shellfish Poisoning
DTX	Dinophysistoxin
dcSTX	decarbomoyl Saxitoxin
EC	European Commission
EU	European Union
EURL	European Union Reference Laboratory for Marine Biotoxins
EHO	Environmental Health Officer
FSA	Food Standards Agency
GTX	Gonyautoxin
HPLC	High Performance Liquid Chromatography
LA(s)	Local Food Authority(ies)
LC-MS	Liquid Chromatography – Mass Spectrometry
LTs	Lipophilic toxins
MPL	Maximum permitted limit
N/A (na)	Not Applicable
ND	Not Detected
OC	Official Controls
OA	Okadaic Acid
PSP	Paralytic Shellfish Poisoning
PST	Paralytic Shellfish Toxins
PTX	Pectenotoxin
PTX2sa	Pectenotoxin 2 seco acid
7-*epi* PTX2sa	7-epi-Pectenotoxin 2 seco acid
RL (<RL)	Reporting Limit
SOP(s)	Standard Operating Procedure(s)
STX	Saxitoxin
UKNRL	UK National Reference Laboratory for Marine Biotoxins
YTX	Yessotoxin

5. References:

AOAC International. (2005). AOAC Official method 2005.06 Quantitative determination of Paralytic Shellfish Poisoning Toxins in shellfish using pre-chromatographic oxidation and liquid chromatography with fluorescence detection. Gaithersburg, MD, USA: AOAC International.

European Communities (2004). Regulation (EC) 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption.

European Communities (2005). Regulation (EC) 2074/2005 of the European Parliament and of the Council of 5th December 2005 which lays down the implementing measures for certain products under Regulation (EC) 853/2004 and for the organisation of official controls under Regulation (EC) 854/2004 and 882/2004, derogating from Regulation (EC) No 852/2004 and amending Regulations (EC) Nos 853/2004 and 854/2004.

European Communities (2004). Regulation (EC) 882/2004 of the European Parliament and of the Council of 29th April 2004, which prescribes requirements for Official Controls performed to ensure the verification of compliance with feed and food law.

European Communities (2004). Regulation (EC) 853/2004 of the European Parliament and of the Council of 29th April 2004 laying down the specific hygiene rules for the hygiene of foodstuffs.

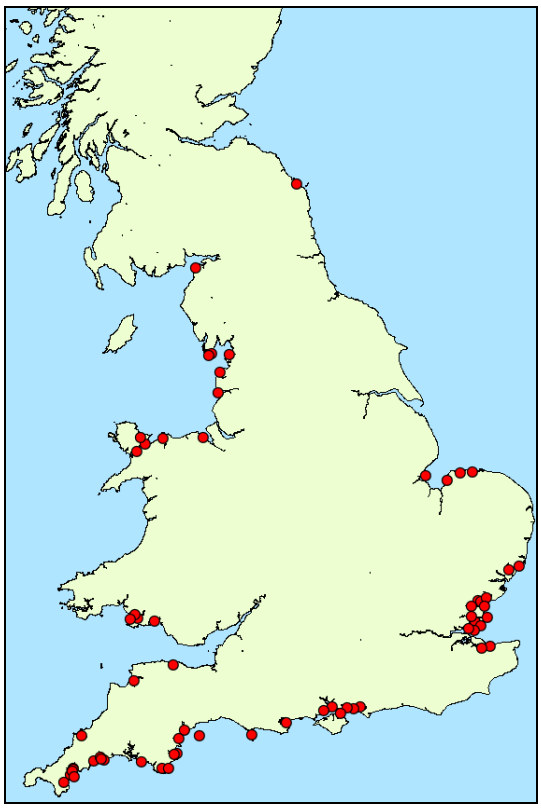
Turner, A.D., Stubbs, B., Coates, L., Dhanji-Rapkova, M., Hatfield, R.G., Lewis, A.M., Rowland-Pilgrim, S., O'Neil, A., Stubbs, P., Ross, S., Baker, C. and Algoet, M. (2014) Variability of paralytic shellfish toxin occurrence and profiles in bivalve molluscs from Great Britain from official control monitoring as determined by pre-column oxidation liquid chromatography and implications for applying immunochemical tests. *Harmful Algae.* **31,** 87-99

van Egmond, H.P., Aune, T., Lassus, P., Speijers, G.J.A. and Waldock, M., (1993). Paralytic and Diarrhoeic Shellfish Poisons, Occurrence in Europe, Toxicity, Analysis and Regulation. *Journal of Natural Toxins*, Vol. 2, No. 1, pp 41-83.

Appendix 1 – Methodology for official control monitoring of toxins in shellfish

A. *Shellfish collection and transport*

In 2016, 38 local authorities (LAs) contributed to the sampling of shellfish from 81 inshore locations (Appended figure 1).



Appended figure 1: English and Welsh flesh sampling locations - Biotoxin monitoring programme 1st January to 31st December 2016

In total, 1303 shellfish samples were submitted from classified production and relaying areas along with 20 samples of wild scallops collected from auction houses, dispatch centres and/or processing plants. Samples were submitted for amnesic shellfish poisoning (ASP) toxins, paralytic shellfish poisoning (PSP) toxins and/or lipophilic toxins (LTs) testing. Environmental Health Officers (EHOs) from Local Authorities (LAs) collected or supervised the collection of shellfish samples from designated monitoring points within classified shellfish production or relaying areas. The samples received from classified production and relaying areas comprised mainly of mussels (*Mytilus* spp.), native oysters (*Ostrea edulis)*, common cockles (*Cerastoderma edule)* and Pacific oysters (*Crassostrea gigas)* (Appended table 1). The remainder of the samples consisted of surf clams (*Spisula solida*), razor clams (*Ensis* spp*)*, manila clams (*Tapes philipinarum)* and hard clams (*Mercenaria mercenaria*). Samples received through the wild pectinidae verification programme were all king scallops which were either whole or shucked prior to arrival at the testing laboratory.

Shellfish samples reached Cefas between 1 and 72 hours post collection, with 94% of samples reaching the lab within 1 working day and over 99% reaching the lab within 2 working days.

Shellfish samples were transported to the testing laboratory using a validated chilled transport system (Coleman 16 Qrt coolboxes). Over 93% of the samples transported in these boxes arrived at the laboratory within the recommended temperature range (2-10°C). Eighty-six samples recorded temperatures between 10.1 and 17.8°C. However, upon inspection, all of these samples met the criteria set by the UK Marine Biotoxins National Reference Laboratory (UKNRL) for testing.

B. Shellfish sample assessment

Unsuitable samples

On arrival at the laboratory, samples were assigned a unique laboratory number and their temperature recorded before they were assessed for their suitability for analysis, in accordance with UKNRL SOPs. Shellfish which failed to respond to a percussion test and/or did not exhibit organoleptic characteristics associated with freshness were excluded from testing and reported as unsuitable for analysis (except for pre-shucked wild Pectenidae samples, which were processed in accordance with UKNRL SOPs). One pre-shucked sample was rejected as unsuitable for analyses in 2016 due to an insufficient number of animals being provided.

Three samples collected from a classified production area were rejected as the samples contained an insufficient number of shellfish. One sample was rejected as the shells supplied were not of a commercial size and one further sample was rejected as 80% of the animals perished in transit.

Samples were also assessed on the basis of their compliance with the requirement of the monitoring programme (namely; shellfish species submitted, frequency of submission and geographical origin of the sample). Samples taken from non-active sites or unclassified species were queried with the LA. If no suitable reason was provided, then the sample was rejected. One sample were rejected on the grounds of being submitted outside the scheduled testing frequency.

Insufficient samples

Samples which were assessed as suitable for analysis were then prepared for ASP, PSP and/or lipophilic toxins analyses as required. In accordance with agreed procedures, should the amount of shellfish available provide insufficient material for all required tests, prioritisation of analyses is based on the historic prevalence of toxin group or lack of previous monitoring results for any toxin group at each site. Where no information is available or prioritisation cannot be ascertained on the above criteria, PSP toxin analyses are prioritised over LT and ASP analyses. No samples were found to be insufficient for the required tests in 2016.

Appended table 1. Summary of samples received and found insufficient/unsuitable for ASP, PSP or lipophilic toxins analyses, by species, in 2016.

Species	Total no. of samples submitted for analysis	No. of samples found insufficient for any of the required tests	No. of samples found unsuitable	No. of samples found unsuitable due to location or frequency	Percentage of samples found insufficient/unsuitable for the required tests (%)
Mussels	650	0	2	1	0.5
Pacific oysters	327	0	1	0	0.3
Native oysters	122	0	0	0	0
Common cockles	68	0	0	0	0
Surf clams	12	0	0	0	0
Manila clams	51	0	0	0	0
Hard clams	73	0	2	0	3
King scallops (whole)	14	0	0	0	0
King scallops (adductor and roe)	6	0	1	0	17
TOTAL	*1323*	0	6	1	0.5

C. Methodology of shellfish analysis

The methods used for routine toxin analysis of shellfish were those specified by the FSA and involved the application of a range of analytical methods. These included liquid chromatography (LC) with Ultra-violet (UV) or fluorescence (FLD) detection or LC with tandem mass spectrometry (MS/MS) for either qualitative screening of samples (screen), semi-quantitation or full toxin quantitation. The methods used for toxin testing were as follows:

ASP testing

- Shellfish species received in the reporting period were tested by LC-UV analysis following extraction with 50% aqueous methanol and filtration of the crude extracts. The quantitative method was applied to all shellfish species and is based on the method of Quilliam et al., 1995.
- ASP results are reported as mg/kg of domoic and epi-domoic acid combined

PSP testing

- Shellfish species received in the reporting period have all been validated at Cefas for the use of a refined LC-FLD method based on AOAC 2005.06. Samples were all extracted with 1% acetic acid and forwarded for qualitative screening and semi-quantitation by LC-FLD. Any samples returning a positive LC screen result and a semi-quantitative total toxicity of >400 µg STX eq/kg were then forwarded for quantitation by LC-FLD.
- Screen positive samples under this limit were reported as <400 µg STX eq/kg. Since implementation, this approach has significantly increased the number of sample results reported within 1 day of sample receipt and increased the ability of the laboratory to deal with large numbers of positive samples during periods of high PSP toxicity.
- Quantitation was conducted following the fully quantitative AOAC 2005.06 method, with final results reported as total toxicities in µg STX eq/kg.

Lipophilic toxins testing

- All shellfish species were analysed by LC-MS/MS for the quantitation of all EU regulated lipophilic toxins. The method used was validated at Cefas based on the conditions stipulated by the EU Reference Laboratory (EU RL) for Marine Biotoxins.
- Results are reported as total toxicities in µg eq/kg for the OA, AZA and YTX groups separately.

Appended table 2 summarises the methods of analysis used throughout this reporting period together with a summary of the current UKAS accreditation status of each method to ISO 17025:2005 standard.

Appended table 2: List of analytical methods used, by species, in 2016

Toxin group	Methods employed	Species tested	Dates	Accreditation status (as of 31st December 2016) to ISO 17025:2005 standard
ASP	LC-UV	All species	1st January to 31st December 2016	Accredited
PSP	LC-FLD (screen, semi-quantitative screen & full quantitation)	All species	1st January to 31st December 2016	Accredited
Lipophilic toxins	LC-MS/MS	All species	1st January to 31st December 2016	Accredited

Test outcome

Samples were considered as positive if they were found to breach the maximum permitted limits (MPL) for marine toxins specified in EC regulation 853/2004 (Table 1).

Where these levels were exceeded, recommendations were for temporary harvesting restrictions to be put in place for all shellfish species classified in the affected area until two consecutive negative or below action level (action level equals MPL) results were achieved for the toxin which was the cause of the closure, and at least one further negative or below action level result for the toxin groups which had not exceeded the MPL.

Routine flesh testing frequencies were defined by the FSA and followed one of three set plans:

1. **Areas with a historic risk of PSP toxins occurrence AND/OR have insufficient historic data**.
   Fortnightly from 1st of April to 30th of September
   Four weekly from 1st of October to 31st of March

2. **Areas with no historic risk of PSP toxins AND historic data**
   Four weekly throughout the year

3. **Area identified as requiring additional monitoring as part of the FSA risk assessment data gathering**
   Weekly throughout the year. Appended table 3 outlines time periods that required weekly monitoring during 2016 at the specified locations.

Appended table 3: Sites monitored weekly during 2016

Local Authority	Production Area: Site Name	Period when weekly sampling agreed
Chichester DC	Chichester Harbour: Hambrook	Apr - Dec
Cornwall PHA	Fal: Mylor Pool/Creek	Jan - Dec
Cornwall PHA	Fal: Grimes Bar / Ruan Pontoon/Tregothnan	Jan - Dec
Cornwall PHA	Fal: Trelissick Pontoon	Jan - Dec
Cornwall PHA	Fowey: Pont Pill	Jan - Dec
Cornwall PHA	Fowey: Wisemans	Jan - Dec
Cornwall PHA	Helford: Porth Navas Quay	Jan - Dec
Cornwall PHA	Lantivet Bay: Sandheap Point	Jan - Dec
Cornwall PHA	Percuil: Percuil	Jan - Dec
Gwynedd CC	Menai Straits West: Area 11 East	Apr - Dec
Portsmouth PHA	Langstone Harbour: Stoke Common Lake	Apr - Dec
Portsmouth PHA	Portsmouth Harbour: Tipner Bridge	Apr - Dec
South Hams DC	Salcombe: Geese Quarries	Feb - Dec
South Hams DC	Start Bay: Off Torcross	Feb - Dec
Suffolk Coastal DC	Butley: Pumping Station Outfall	Jan - Dec
Suffolk Coastal DC	Deben: Stonner Point	Jan - Dec

In addition, requests were made for weekly shellfish monitoring to be instigated when set trigger levels, indicative of heightened toxicity risk were breached. The trigger levels used in the 2016 reporting period are summarised in Appended table 4:

Appended table 4: Flesh trigger levels

Toxin group	Levels of toxin or cell concentrations triggering additional monitoring if breached
ASP	≥10mg domoic/epi-domoic acid/kg shellfish flesh
LTs	OA/DTX/PTX group: ≥80 µg OAeq./kg shellfish flesh AZA group: ≥80 µg AZA1eq./kg shellfish flesh YTX group: ≥1.8mg/kg shellfish flesh
PSP	≥400µg STX eq./kg shellfish flesh

D. Reporting of results

Upon completion of the required analyses, the results were collated and quality controlled prior to submission to FSA. Results were reported on a daily basis. A summary of results turnaround times, from day of receipt to completion of each analysis for 2016 is given in Appended tables 5 and 6.

For reference, the turnaround times agreed with the FSA and required from Cefas during the reporting period are given in Appended table 7.

Appended table 5: Turnaround times, by test carried out, for samples received from classified production and relay areas in 2016

Territory	No. of tests performed	No. of completed results reported within one working day of receipt of sample	No. of completed results reported two working days post receipt of sample	No. of completed results reported three working days post receipt of sample
ASP by HPLC	1178	1178 (100%)	0	0
Lipophilic toxins by LC-MS	1224	1221 (>99%)	3 (<1%)	0
PSP by HPLC (screen)	1228	1228 (100%)	0	0
PSP by HPLC (quantitation)	12	1 (8%)	11 (92%)	0
Totals	**3642**	**3628 (>99%)**	**14 (<1%)**	**0**

Appended table 6: Turnaround times, by test carried out, for samples of wild pectenidae collected from auction houses, dispatch centres and/or processing plants in 2016

Territory	No. of tests performed	No. of completed results reported within one working day of receipt of sample	No. of completed results reported two working days post receipt of sample	No. of completed results reported three working days post receipt of sample
ASP by HPLC	19	19 (100%)	0	0
Lipophilic toxins by LC-MS	11	11 (100%)	0	0
PSP by HPLC (screen)	11	11 (100%)	0	0
PSP by HPLC (quantitation)	0	0	0	0
Totals	**41**	**41 (100%)**	**0**	**0**

Appended table 7: Sample turnaround times (from sample receipt) specified by FSA

Toxin and analysis method	FSA specified targets
ASP by HPLC	80% within 1 working day 100% within 3 working days
Lipophilic toxins by LC-MS	70% within 1 working day 100% within 3 working days
PSP by HPLC (screen/semi-quantitation)	80% within 1 working day 100% within 3 working days
PSP by HPLC (quantitation)	80% within 2 working days 100% within 4 working days

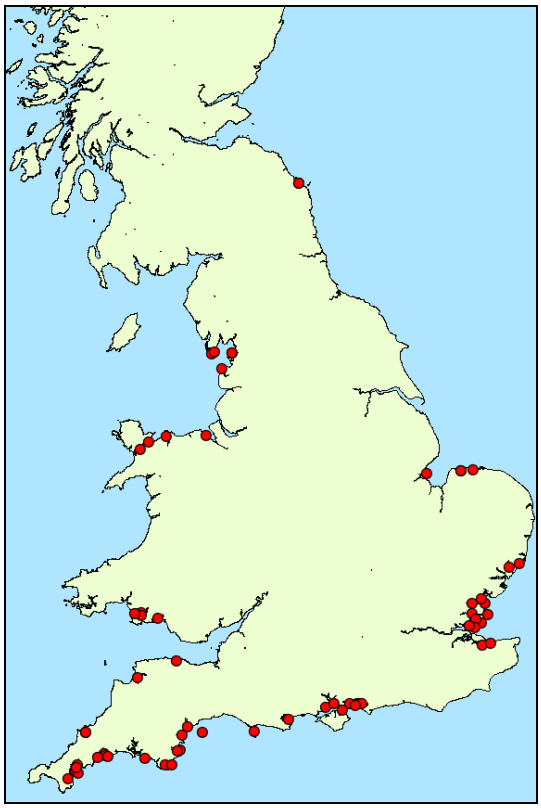
Required turnaround times were therefore all met and for all analyses, delivery by the laboratory exceeded the targets agreed with FSA.

In addition to the daily reporting schedule, all results from samples received between Monday and Friday the previous week were collated and reported in a weekly results sheet to FSA, released the following week.

Appendix 2 – Methodology for official control monitoring of toxic phytoplankton in classified shellfish production areas

A. *Phytoplankton sample collection and transport*

1086 phytoplankton samples were collected by environmental health officers from 50 classified production or relaying areas around the coast of England and Wales (Appended figure 1).



Appended figure 1. English and Welsh water sampling locations – 2016 Biotoxin monitoring programme

Sample collectors were requested to take depth integrated water samples from above the harvesting areas, at high water when possible. Tube samplers were provided to local authority staff who had access to boats, or where piers and jetties were sufficiently close to the flesh sampling points to allow a depth integrated sample to be taken. However, it was recognised that their use was not always practical in shallow, coastal areas and a homogenised sample, collected from three depths (near bottom, midwater and near surface) using a pole sampler, was recommended as a preferential alternative to sampling surface water with a bucket.

A 500mL nalgene bottle was filled with water from each sample collection, which was preserved with the addition of 2mL of acidified Lugol's Iodine. Preserved samples were then posted in pre-paid special delivery bags, together with a completed sample collection form, to the Cefas plankton laboratory for analysis.

B. Assessment of sample suitability

On arrival at the laboratory, samples were assigned a unique laboratory number. Sub-samples were then set up in 25mL Utermöhl chambers and allowed to settle. After three hours each sample was given a preliminary examination. If the viewing area contained too much sediment, then an additional sub-sample was set up in a 10mL or 5mL Utermöhl chamber. All samples were allowed to settle for a minimum of 12 hours before the final suitability assessment was made. If after 12 hours, the viewing area of the smaller chamber was also obscured by sediment then these samples were reported as "unable to analyse" in the weekly results sheet.

A total of 26 samples (2.39%) were rejected, most of these (n=19, 1.75%) were due to high sediment concentrations in the water. This is a further decrease on the previous year's figures, of which 3% (n=28) were rejected due to high sediment concentrations. This reflects ongoing efforts by Cefas and the collectors to resolve issues in some locations by either changing the sampling location or the sampling method. Seven other samples were rejected; five were submitted outside of the routine testing frequency, one had been sampled using the incorrect method for that site, and one had been collected from the wrong monitoring site.

C. Water sample analysis

Water analyses followed the standard operating procedures drawn up by the UK national reference laboratory for marine biotoxins. Phytoplankton analyses are accredited to ISO 17025:2005 standard.

Test outcome

'Trigger levels' remained at the same cell concentrations as in previous years (Appended table 1). When these levels were breached, the FSA was immediately contacted and requests were made for additional water and shellfish samples to be collected and submitted for analysis the following week.

Appended table 1: Trigger levels for toxin producing algae

Toxin	Toxin producing algae (trigger Level)
ASP	*Pseudo-nitzschia spp.* (150,000 cells/L)
LTs	*Dinophysiaceae* (100 cells/L) *Prorocentrum lima* (100 cells/L)
PSP	*Alexandrium spp.* (Presence)

D. Reporting of results

Upon completion of analyses, results were collated and quality control checked prior to submission to the FSA. During 2016, Cefas was able to report all results within one working day of sample receipt. This turnaround time is in full compliance with the targets specified by the FSA which is set at 98% of results reported within 3 working days of sample receipt. In addition to the daily reporting schedule, all results from samples received the previous week were collated and reported in a weekly results sheet to the FSA, released by the following week.