**Menai Strait Areas 2 and B West - Investigation into a High E. coli Result in Mussels – 22nd November 2022**

1. **Background**

The Menai Strait (East) Mussel and Oyster Fishery Order (“MSEMOFO”) area , in the eastern end of the Menai Strait, is administered by the Menai Strait Fishery Order Management Association (“MSFOMA” <https://www.msfoma.org/>} and contains one of the largest mussel fisheries in the UK.

The classified shellfish beds within the MSEMOFO have good quality mussels which are mostly consistent with regulatory Class A. However, due to occasionally high *E. coli* counts, only one of six areas has a seasonal “A” classification, with the remaining areas classified as “B”. Bangor Mussel Producers (the cooperative of companies that operate the mussel production leases within the Several Order) depend on export to the EU. Since EU-exit, this requires that live shellfish exported from the UK to the EU must originate from class “A” waters.

1. **Issue**

On 2nd December 2022 MSFOMA was notified that a high E.coli result was recorded which was above the trigger level of 700 E. coli/100mg in a classification sample:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Classification zone (including sample co -ordinates) | Sample Date | Result E.coli 100g | Species sampled | Existing classification |
| Areas 2 and B West | 22.11.2022 at 14.00 | 780 | *Mytilus spp.* | SEASONAL-A (seasonal)1 Oct to 30 Apr |

Areas 2 and B West are represented by Cegin Channel Representative Monitoring Point (RMP):

Map

Description automatically generated

Results for the Cegin Channel RMP for the last 6 years[[1]](#footnote-1) are shown below:

Chart

Description automatically generated with medium confidence

These data show that in the past 3 years 75% of samples (21 out of 28) fell within class “A” with 4 samples over the 700 E. coli /100g threshold, none of which have previously occurred within the period October to April inclusive. This indicates that the November 2022 result of 780 E.coli/100g is very unusual and likely to be caused by a contamination event.

1. **Environmental Conditions**

There is very high economic interest in better understanding the sources and patterns of E. coli contamination in the area. Several rivers with significant catchments and populations discharge into the Menai Strait. The area is affected by urban and rural municipal wastewater, discharge from wastewater treatment facilities and probably also by private septic tanks. Agricultural and wildlife-derived contamination may also affect the microbial water quality.

The current area classifications are based on the analysis of shellfish samples taken approximately monthly from Representative Monitoring Points (RMPs). This frequency does not sufficiently explore the temporal pattern of microbial contamination or the frequency of contamination ‘events’ and does not resolve the dynamics associated with high rainfall events. The current data lack information on whether the pollution is human sewage-derived or agriculture-related, nor the relative contribution of potential sources.

The Shellfish Centre (Bangor University) has been carrying out a study (: Project 12b Microbial sources tracking in Menai Strait, North Wales) which aims to better understand the environmental factors affecting microbial water quality and shellfish hygiene in the Menai East shellfish area and how variations in harvesting practices and sampling could be incorporated into modification of the application of the shellfish official control regulations. This project will also help to identify the periods when faecal indicator concentrations peak, as well as inform on the source of contamination and the duration of higher risk periods. Data from this study has been used below in addition to information from Natural Resources Wales.

NRW Bethesda rain gauge recorded 31.6mm rain on 21st Nov.

Chart, histogram

Description automatically generated

The closest river gauging station operated by NRW is on the River Seiont at Peblic Mill:

Chart, line chart

Description automatically generated

The Seiont river level increased by around 0.5m between 1200 on 21st November and 0500 on 22nd November in response to the rainfall on 21st November.

Flows in the River Ogwen have been monitored by the Shellfish Centre study and show that there was a response in the discharge of the Afon Ogwen. Peak discharge of this event 24.59 m3/s @1615 21/11/22, remaining similar until around 2115. The investigation-triggering sample was taken at Cegin RMP around 17hrs later at 1400 22/11/22.

A picture containing chart

Description automatically generated

Graphical user interface, chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

The routine sampling for the study also occurred on 21 and 22/11/22.

Triplicate river samples (taken before the Ogwen discharge peaked on 21/11/22) gave mean concentrations of

|  |  |  |
| --- | --- | --- |
| Ogwen | 21/11/22  1420 | 10533   *E. coli*/100ml |
| Cegin | 21/11/22  1400 | 666   *E. coli*/100ml |
| Adda | 21/11/22  1342 | 4100  *E. coli*/100ml |

The shellfish results are for the statutory RMPs and were taken earlier in the day than official control samples on 22/11/22

|  |  |  |
| --- | --- | --- |
| West of Bangor Pier | 22/11/22  0825 | 490  *E. coil* /100g (MPN) |
| Cegin Channel | 22/11/22  0819 | 490 *E. coil* /100g (MPN) |
| Gallows Point | 22/11/22  0906 | 490 *E. coil* /100g (MPN) |
| Ogwen Channel | 22/11/22  0942 | 1300 *E. coil* /100g (MPN) |

There are a number of sewage treatment works (orange points) and Combined Sewer Overflows (CSOs – black circles) ) which discharge either directly into the area or into rivers which flow into the Menai Strait. All of these discharges are consented and are monitored by Dŵr Cymru Welsh water (DCWW) and they are able to provide event duration data for all CSOs into the area.

Map

Description automatically generated

The main discharges are:

To the Strait:

* Bangor Beach Road Pumping Station.  Permit: CG0351702
* Gorad Road pumping station. Permit: CG0353701

To the Afon Ogwen:

* Tregarth sewage works settled storm. Permit: CG0083802
* Fron Ogwen pumping station (pumps to Tregarth) Permit: CG0083901
* Rock Terrace CSO, Bethesda. Permit: CG0164901
* Bethesda sewage works storm. Permit: CG0437401
* CSO at Maes Bleddyn, Rachub. Permit: MP3328XV (to a trib of the Ogwen)

To the Afon Cegin:

* Glasinfryn pumping station. Permit: CG0185201
* Rhiwlas sewage works. Permit: CG0086002

Verbal reports from NRW confirm that on 22nd November the CSOs at Tregarth Sewage Treatment Works and Bethesda Sewage Treatment Works were both discharging and this is confirmed by the spill summary data provided by DCWW for the period 20th to 22nd November 2022 inclusive.

|  |  |  |  |
| --- | --- | --- | --- |
| **Site Name** | **Permit Number** | **No of Spills** | **Duration of Spills (h)** |
| BANGOR BEACH ROAD PS SHORT SEA FALL | CG0351701 | 0 | 0 |
| BANGOR BEACH ROAD PS | CG0351702 | 0 | 0 |
| BANGOR TREBORTH STW | CG0366101 | 0 | 0 |
| Beaumaris WwTW Storm | CG0342902 | 1 | 1 |
| BEAUMARIS (ANGLESEY) MOUNT FIELD PS | CG0342904 | 0 | 0 |
| Rock Terrace CSO, Bethesda | CG0164901 | 3 | 16.5 |
| Bethesda STW | CG0437401 | 4 | 42 |
| Llanfairfechan No 1 | CG0077101 | 2 | 10.25 |
| Rhiwlas WWTW | CG0086002 | 2 | 1.75 |
| Tregarth STW | CG0083802 | 3 | 36.5 |
| Fron Ogwen pumping station (pumps to Tregarth) | CG0083901 | 0 | 0 |
| CSO at Maes Bleddyn, Rachub. Permit | MP3328XV | 1 | 0.75 |
| Glasinfryn pumping station | CG0185201 | 0 | 0 |

1. **Conclusions**

* The high E.coli result of 780/100mg was highly unusual for the Cegin RMP with only 4 samples in the past 3 years above the 700/100mg threshold and none at this time of year.
* There was a rainfall event on the day before sampling which resulted in an increased river discharge on 22nd November in the Afon Seiont and Afon Ogwen. This was probably replicated in other rivers flowing into the Strait. High levels of E. coli were recorded on the Ogwen 24 hours prior to the sample that had the high result (mean 10,533/100ml).
* Storm overflows at both sewage treatment works and CSOs were operating in the area spilling untreated sewage directly into the strait and the rivers flowing into the Strait.
* These pollution discharges are highly likely to have caused this anomalous result which should be discounted.

Further to these observations, we would draw your attention to the difference between the result for the mussel sample taken from the Cegin Channel RMP at 0819 on the 22nd November (490 E.coli / 100ml) and the sample taken at 1400 on the same day (780 E.coli / 100ml). The former was taken when the tide was in, and is thus representative of the catch taken by mussel dredgers; the latter was taken when the tide was out, and does not represent the typical catch from this area.

ALAN WINSTONE  
Chair, MSFOMA  
12th December 2022

1. <https://www.cefas.co.uk/data-and-publications/shellfish-classification-and-microbiological-monitoring/england-and-wales/shellfish-monitoring-results/details/?species=MUS&connection=SHS&PointID=B055T> [↑](#footnote-ref-1)