

# Blue Mussel (*Mytilus edulis*) Inspection Report

## Blyth 2026

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## Summary

Annual surveys of the Blyth estuary mussel bed were conducted in March 2026. Since 2015 the perimeter of the mussel bed has been mapped, and percentage cover of mussels estimated using the MarinX 'Dutch Wand' survey technique. Live mussel samples were not collected again this year due to ongoing concerns regarding the limited number of mussels remaining on the bed and the 2026 survey revealed a continuation of long-term decline.

### Key results:

- overall bed area and percentage cover have steadily reduced, with the most pronounced loss occurring between 2024 and 2025
- overall bed area decreased by 93% from 27,310 m<sup>2</sup> in 2015 to 1,548 m<sup>2</sup> in 2026
- average percentage cover fell to 7% overall in 2026, compared with 37% in 2015
- sector analysis showed widespread reduction in bed area including a complete loss of sector 1 and 4
- sector 2 has recovered very slightly since 2025 from 0% to 2% cover
- recruitment was minimal: no spat was observed in 2026, and seed mussels (30–45 mm) were confined to sector 3 but at low density of 1-2% estimated percentage cover.

The findings highlight that the mussels beds are still under severe stress, with evidence suggesting that reduced adult mussel cover and unsuitable settlement habitat is limiting spat settlement and survival. The original drivers of decline are still unclear however potential drivers include, recruitment failure, changes in sediment, environmental factors, industrial contamination, historic unsustainable levels of bait collection and sediment disturbance from dredging.

Broader regional declines have been documented across the North Atlantic by many experts. Current conditions suggest the Blyth mussel beds may not be self-sustaining despite the reported presence of mussel on floating and hard structures. Bed on sediment and are at risk of local extinction. In their current condition the mussel at Blyth would not meet the OSPAR habitat definition of an intertidal mussel bed found on mixed and sandy sediments.

NIFCA are reviewing survey plans for 2027, whilst supporting local and national partners to investigate the roles of contaminants, pathogens, and pharmaceuticals in mussel health. Restoration initiatives and collaborative research are underway to address knowledge gaps and explore options for recovery.

## Introduction

The blue mussel (*Mytilus edulis*) is a filter-feeding bivalve mollusc consuming phytoplankton, and other particulate organic matter. It is found on a variety of substrata in the intertidal zone of boreal and temperate waters, in both the southern and northern hemispheres (OSPAR, 2014). The blue mussel can accumulate to form beds and is tolerant of a wide variety of environmental conditions including fluctuations in salinity, oxygen, temperature, and desiccation (Andrews et al., 2011).

Mussels can form dense beds using byssus threads to attach to the substratum (Babarro et al., 2008) and can be considered a biogenic reef. The dense beds which occur in both fully saline and estuarine waters form natural reefs or biogenic reefs which enhance biodiversity (Gardner, 1996). Mussel beds are included in the OSPAR (Annex V) list of threatened and declining species and habitats and are also listed as a Habitat of Principle Importance under the Natural Environment and Rural Communities Act, 2006. The OSPAR definition for intertidal blue mussel habitats specifies a minimum of 30% percentage cover to be classified as a mussel bed (OSPAR, 2010; Julie Lydia Stounberg et al., 2024). However, the Danish definition states there must be continuous areas of at least 2500m<sup>2</sup> again with a 30% average cover but also the presence of at least three size cohorts of mussel (Dahl & Peterson, 2018).

Blue mussel beds continue to decline in Northumberland especially on intertidal sediments, and some areas across the UK, but the causes remain unclear and may vary by region with the mussel beds in Teesside continuing to do well in comparison to Northumberland. To address this, the mussel bed restoration network continues to share knowledge, identify research gaps, and further understand the drivers of decline.

Berwick to St Mary's Marine Conservation Zone (MCZ) lies adjacent to the Blyth mussel beds and is designated for eider duck, which rely on mussels as a primary food source. As such, these mussel beds are an important supporting habitat, especially in the context of recovering eider populations within the MCZ. Studies are ongoing to assess the use of alternative food sources by eider duck such as shore crab, periwinkle etc, with shore crabs commonly observed in their diet within the Northumberland Inshore Fisheries and Conservation Authority (NIFCA) district.

## Blyth

In late 2014, NIFCA received reports of increased bait collection activities in and around the mussel beds on the Blyth estuary. Due to the site's significance for protected bird species and public concerns, NIFCA initiated monthly stock assessment surveys of the mussel beds from March 2015 to February 2016, and has continued to conduct annual surveys in March/April since then. There are multiple historical records and anecdotal information about scarcity of mussel in

the Blyth estuary from the early 1900s to present day, attributed to hand gathering and river dredging (Lebour, 1906).

In 2024 the Blyth mussel beds exhibited continued declines, prompting a change in methodology for 2025 and 2026 to preserve the remaining mussel. Due to significant biomass reduction, stock assessment since 2025 involves a walkover inspection of the bed perimeter and estimated percentage cover. Previous assessments are available on the NIFCA website.<sup>1</sup>

The Blyth estuary (Figure 1) is part of the Northumberland Shore Site of Special Scientific Interest (SSSI) which includes most of the coastline between the Scottish border and the Tyne Estuary and Northumberland Marine SPA. The intertidal mudflats of the estuary provide important low-water feeding grounds and high-water roosting grounds for large numbers of overwintering waders including oystercatcher, ringed plover, lapwing, dunlin, redshank and turnstone. Eider duck, knot, curlew and terns (sandwich and common) also use the estuary during the summer.

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<sup>1</sup> <https://nifca.gov.uk/resource-hub/>



**Figure 1 - The Blyth Estuary mussel beds in 2025**

## Methods

Walkover inspections were conducted at low water during spring tides on the 19<sup>th</sup> of March 2026 by NIFCA officers.

### Survey Methods

Prior to 2025, mussel samples were collected for analysis for density, total biomass and length frequency (Harvey, 2020; Boon, 2020; Harvey et al., 2024). Due to the declines of blue mussel, no samples were collected for analysis since 2024. Percentage cover was estimated using the MarinX 'Dutch Wand' technique in addition to the estimated bed area by walking the perimeter of the beds.

### NIFCA Mussel Inspection Protocol

#### Perimeter

Two Inshore Fisheries & Conservation Officers (IFCOs), one of whom has previously walked the perimeters of each sector of the Blyth mussel beds, walk the perimeter with a handheld GPS. Confidence in the accuracy of the area is very low as the area of the remaining mussel is too difficult to define as the trend of overall decline continues. There is no WFD definition of what constitutes a mussel bed so it can be subjective to define mussel bed area. The information collected was exported as a GPX file from the GPS using the Garmin GPS software Basecamp and then imported into ARCPPro to map and calculate the area of the mussel bed. Prior to the survey the bed itself was classified as the same area from the 2025 surveys as a guide but officers also walked previous areas from historical beds for completion (Richardson, 2025).

To determine the extent of the bed scattered mussels are usually included as they are often ignored if their density is greatly below that of the main bed. If an in-situ assessment judges them to contain significant numbers of mussels, and the main bed has a low density, they are included. Similarly with isolated patches, if they are a long way from the bed and contain few mussels they are ignored, if they are close and contain high numbers of mussels they are included. If they are distant but contain significant numbers of mussels, they had their perimeter measured separately.

#### Percentage cover

Typical transects "zig-zagging" of the bed was conducted to get appropriate coverage of the bed area and percentage cover is estimated using the traditional methods for each bed:

### MarinX 'Dutch Wand' technique

The percentage cover of mussels on the mussel bed was estimated using the MarinX 'Dutch Wand' survey technique (McGrorty et al., 1990). Surveyors walked in a zigzag across the mussel bed, in a randomly determined direction. The Dutch wand (a 4ft bamboo cane with an 11cm ring

attached to the end) was placed out to one side every three steps and the result of either a 'hit' (if the ring contained live mussels) or a 'miss' (if the ring did not contain live mussels) was recorded. Percentage cover was then calculated using the equation:

$$\text{Percentage Cover} = \frac{\text{Number of Hits}}{\text{Number of Hits} + \text{Number of Misses}} \times 100$$

### Bed Condition Assessment

The bed condition was assessed during the transects for percentage cover at intervals along each transect, or where the bed conditions changed. Officers noted a way point on their GPS, took an image and noted down the bed criteria as detailed below :-

- presence of seed mussel
- size of seed mussel (<15 mm, 15-30 mm, 30-45 mm)
- estimated percentage cover of seed mussel
- density of seed mussel
- presence of size mussel
- measurement of mussel if possible
- density of size mussel
- density of size mussel (high/medium/low)
- size of mussels, mixed or uniform
- presence of dead shell
- estimated percentage cover of dead shell
- ground description.

## Results

A summary of the overall survey results since the mussel beds began being surveyed in Blyth, can be seen in Table 1.

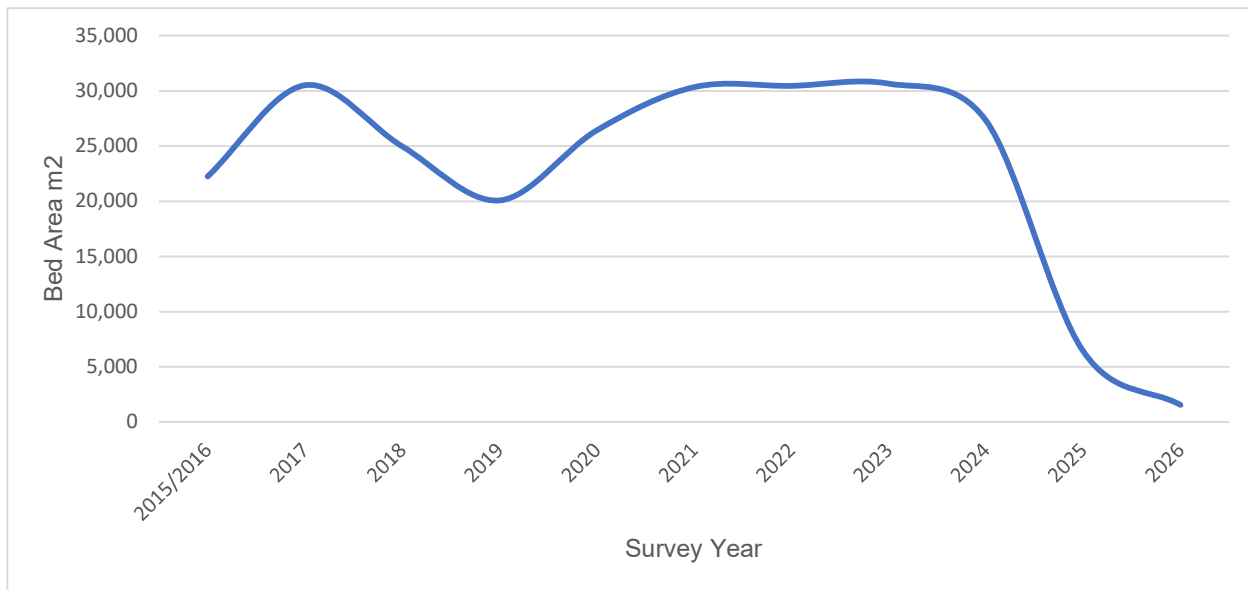
**Table 1:** Results for the overall bed area for all sectors Blyth mussel survey between 2015 and 2026

| Year             | Bed area (m <sup>2</sup> ) | Average % cover | Mean shell length (mm) | Mussel density (no./m <sup>2</sup> ) | Biomass (kg/m <sup>2</sup> ) | Total Weight (g) |
|------------------|----------------------------|-----------------|------------------------|--------------------------------------|------------------------------|------------------|
| <b>2015/2016</b> | 22,247                     | 35%             | 41                     | 111                                  | N/A                          | 17               |
| <b>2017</b>      | 30,499                     | 31%             | 38                     | 118                                  | N/A                          | 6650             |
| <b>2018</b>      | 24,980                     | 36%             | 32                     | 396                                  | N/A                          | 1680             |
| <b>2019</b>      | 20,080                     | 37%             | 35                     | 286                                  | N/A                          | 831              |
| <b>2020</b>      | 26,410                     | 30%             | 38                     | 399                                  | N/A                          | 964              |
| <b>2021</b>      | 30,330                     | 24%             | 30                     | 109                                  | 1.26                         | 1394             |
| <b>2022</b>      | 30,444                     | 17%             | 37                     | 55                                   | 0.76                         | 855              |
| <b>2023</b>      | 30,661                     | 16%             | 49                     | 22                                   | 0.45                         | 509              |
| <b>2024</b>      | 27,310                     | 9%              | 42                     | 20                                   | 0.33                         | 530              |

|             |       |     |     |     |     |     |
|-------------|-------|-----|-----|-----|-----|-----|
| <b>2025</b> | 6,405 | 12% | N/A | N/A | N/A | N/A |
| <b>2026</b> | 1,548 | 7%  | N/A | N/A | N/A | N/A |

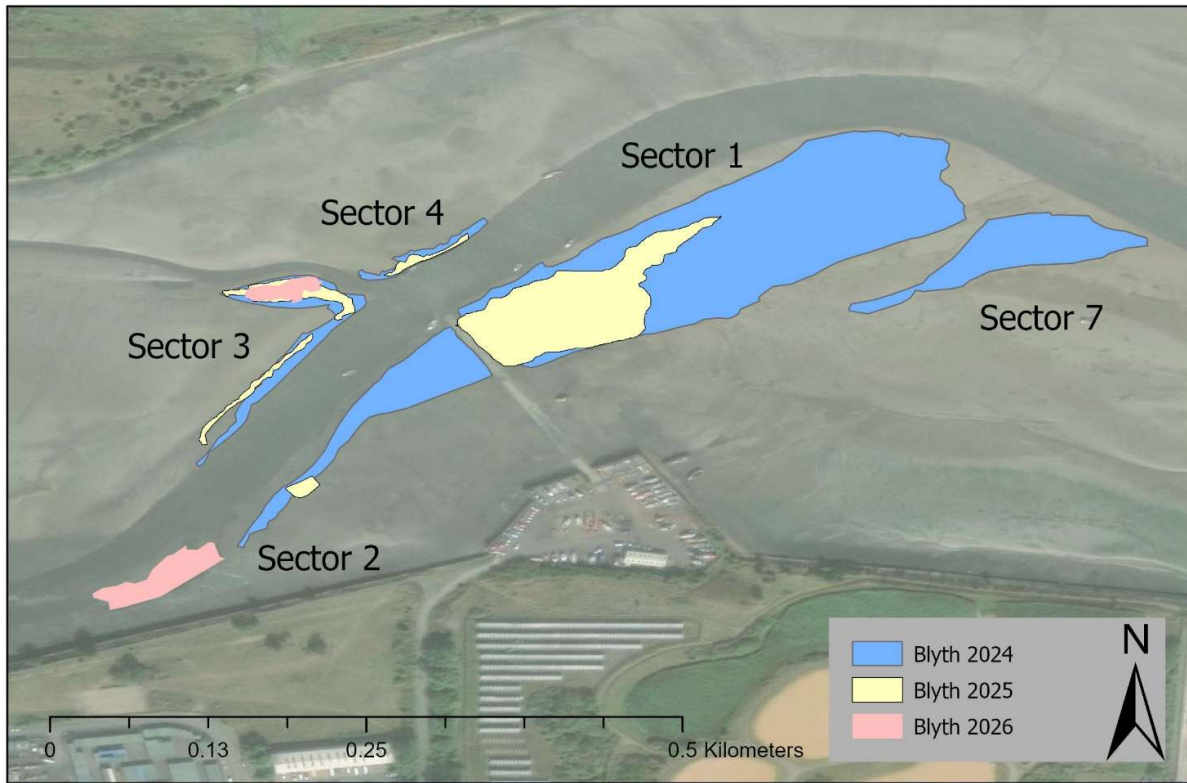
### Bed Area

Since surveys commenced in 2015 the mussel beds at Blyth have experienced a continuous decline (Table 1). In 2026 there is little confidence in the accuracy of bed area estimates and there has been a further observable loss of mussels since the 2025 surveys (Figure 2).

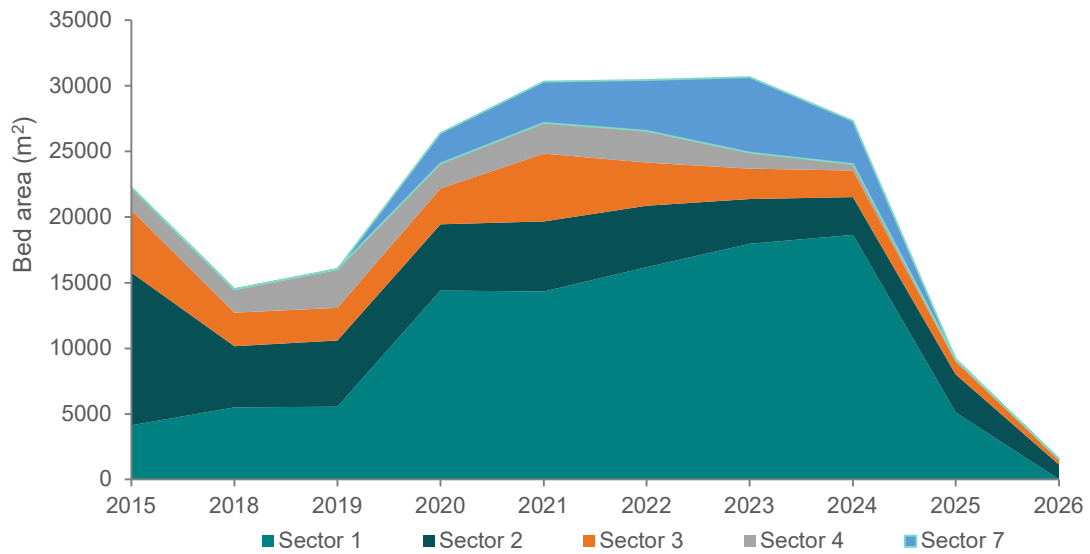


**Figure 2** – Overall bed area in the Blyth estuary from 2015 – 2026

Overall bed area was relatively stable between 2015 and 2024 where it has reduced by 93% since from 27,312 m² to 1,548 m² in 2026. All sectors surveyed (sector 3.2 and sector 2) have reduced in overall area since 2025 with sector 1, 3.2 and 4 lost since 2025. Sector 3.1 remains since 2024 but has reduced in size from 710 m² to 423 m². Figure 3 shows the reduction in each sector of the mussel bed since 2024 and Figure 4 the overall reduction in each sector from 2015 to 2026.



**Figure 3** - Comparison of The Blyth Estuary Mussel bed area and perimeters by sector from 2024 to 2026

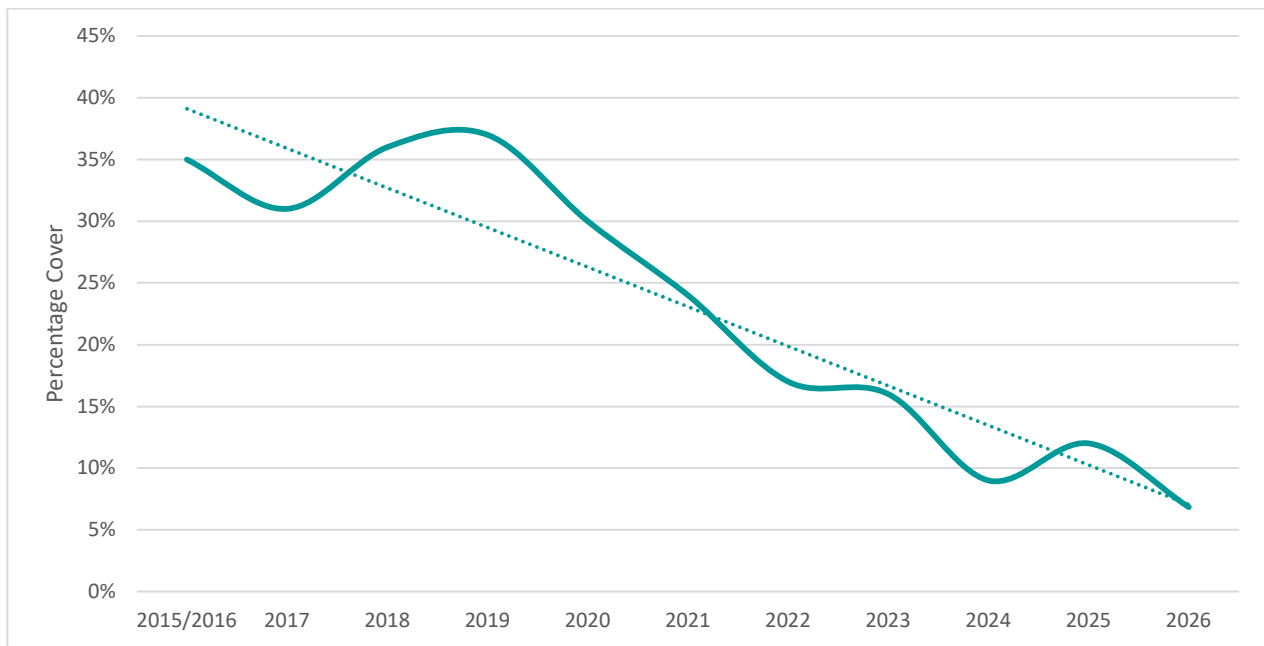


**Figure 4** – Bed area in remaining sectors of The Blyth Estuary Mussel bed from 2015 - 2026

## Percentage Cover

### Overall

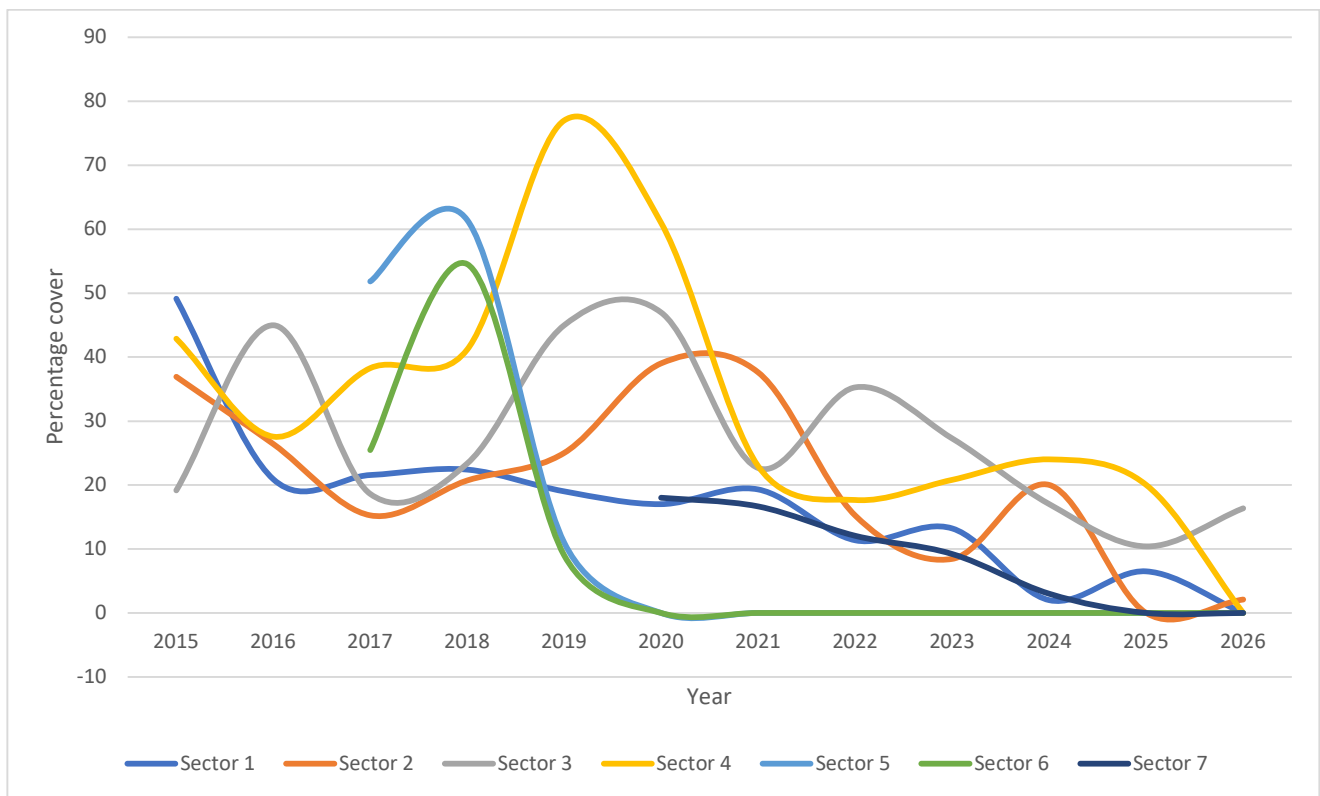
From 2015 to 2026 the average overall percentage cover of the mussel bed at Blyth has been in significant decline from 37% cover in 2015 to 7% cover in 2026 (Figure 5).



**Figure 5** - Average percentage cover estimates for Blyth, for the years they have been surveyed, with trendline highlighting the decline.

#### *By sector*

Percentage cover varied both between and within sectors across the Blyth estuary.



**Figure 6** – Percentage cover by sector from 2015 to 2026

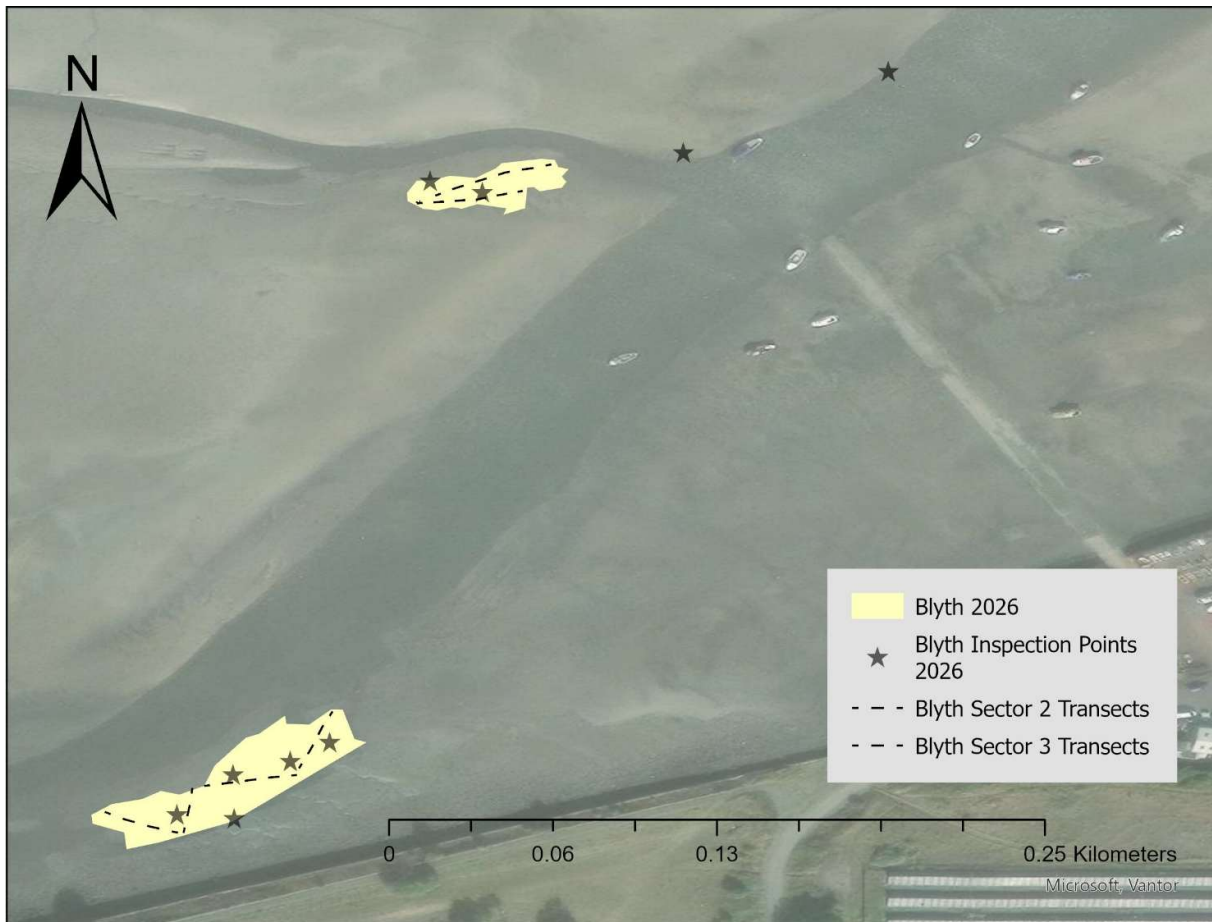
All sectors have steadily declined or disappeared since 2015 (Figure 6). Sector 1 and 4, have disappeared since the 2025 surveys in addition to sector 2. Percentage cover from transects taken in sector 2 has increased from 0% to 2.8% in 2026. (Table 2). While this population has fluctuated over time, 2026 shows very small recovery. Sector 1 and 4 are now absent and Sector 7 which was walked over in 2026 has not returned since 2024. In 2025, sector 3 was split into two sectors, 3.1 and 3.2 due to perceived loss of connectivity and the percentage cover remains steady at 16.3% from 17% in sector 3.1 from 2024 through to 2026 though the area of the bed has reduced. Sector 3.2 has been completely lost between the 2025 and 2026 surveys, with only a small area of sector 3.1 remaining.

**Table 2** - Percentage cover from transects across the Blyth mussel bed from 2024 to 2026 per sector.

| Sector Number 2025 | Percentage cover per sector 2024 | Percentage cover per sector 2025 | Percentage cover per sector 2026 |
|--------------------|----------------------------------|----------------------------------|----------------------------------|
| Sector 1           | 2%                               | 6%                               | 0%                               |
| Sector 2           | 20%                              | 0%                               | 2.8%                             |
| Sector 3.1         | 17%                              | 17%                              | 16.3%                            |
| Sector 3.2         |                                  | 3%                               | 0%                               |
| Sector 4           | 24%                              | 20%                              | 0%                               |
| Sector 7           | 3%                               | 0%                               | 0%                               |

The beds continue to fail the OSPAR criteria for mussel beds, as mussel densities are below the required threshold of 30% cover, both within individual sectors and across all sectors.

Figure 7 shows the Blyth mussel bed sectors mapped in 2026 and the locations of transects used to assess percentage cover. Star symbols mark the bed inspection locations, which correspond to the data and images in Table 3.



**Figure 7** - Blyth Estuary sectors with transects and inspection points 2026

### Bed Inspections

Table 3 provides a summary of the bed inspection results for each sector in 2026. Inspections were conducted across only sector 2, 3.1 and 4 as other sectors from 2025 were no longer present.

Sectors 1, 3.2, 4 and 7 were walked over and sector 1, 3.2 and 7 had no trace of mussel bed.

Sector 4 was inspected in two areas, however, there was not enough live mussel found therefore no transects were carried out. The most northerly inspection point had 70% cover of dead shell and the other 10-15%. Both inspection points consisted of firm muddy sand and gravel/shell.

Sector 2 contained a mix of mussel sizes from 35-50 mm at a very low density, dead shell was present ranging from 5-20% cover and the majority of the ground was soft and muddy with stones and gravel.

Sector 3.1 had seed mussel at 30-44 mm in size and some size mussel in a mix of size classes. Dead shell was present across the sector at a percentage of 30–80% and the ground was firm muddy sand with shells and gravel.

Sector 1 was walked to check for the presence of any mussels and some images and waypoints taken of the ground conditions, however no mussel were found.

**Table 3** - Blyth Estuary inspection criteria results for sector 2 and 3.1

| Criteria                         | Sector 2                                                                                                                                | Sector 2                                                                                                                                            | Sector 2                                                                                                                                                | Sector 2                                                                                                                          | Sector 2                                                                                                                                    |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Transects                        | 1151                                                                                                                                    | 1152                                                                                                                                                | 1153                                                                                                                                                    | 1154                                                                                                                              | 1155                                                                                                                                        |
| Seed mussel Present              | No                                                                                                                                      | No                                                                                                                                                  | No                                                                                                                                                      | No                                                                                                                                | No                                                                                                                                          |
| Size of seed mussel              | NA                                                                                                                                      | NA                                                                                                                                                  | NA                                                                                                                                                      | NA                                                                                                                                | NA                                                                                                                                          |
| Estimated % cover of seed mussel | NA                                                                                                                                      | NA                                                                                                                                                  | NA                                                                                                                                                      | NA                                                                                                                                | NA                                                                                                                                          |
| Density of seed mussel           | NA                                                                                                                                      | NA                                                                                                                                                  | NA                                                                                                                                                      | NA                                                                                                                                | NA                                                                                                                                          |
| Presence of size mussel          | Yes                                                                                                                                     | Yes                                                                                                                                                 | Yes                                                                                                                                                     | No                                                                                                                                | Yes                                                                                                                                         |
| Size of mussel seen              | 35 mm                                                                                                                                   | 50 mm                                                                                                                                               | 40-50 mm                                                                                                                                                | NA                                                                                                                                | 45 mm                                                                                                                                       |
| Density of size mussel           | Very Low                                                                                                                                | Very Low                                                                                                                                            | Very Low                                                                                                                                                | Very Low                                                                                                                          | Only 1 mussel                                                                                                                               |
| Size of mussels (mixed/uniform)  | NA                                                                                                                                      | NA                                                                                                                                                  | Mixed                                                                                                                                                   | NA                                                                                                                                | NA                                                                                                                                          |
| Dead shell present               | Yes                                                                                                                                     | Yes                                                                                                                                                 | Yes                                                                                                                                                     | Yes                                                                                                                               | Yes                                                                                                                                         |
| Estimated % cover of dead shell  | 10%                                                                                                                                     | 20%                                                                                                                                                 | 10%                                                                                                                                                     | 5%                                                                                                                                | 10%                                                                                                                                         |
| Images                           | 15<br>                                                | 16<br>                                                           | 17<br>                                                              | 18<br>                                        | 19<br>                                                  |
| Description                      | Soft, muddy ground with stones and gravel. Dead mussel and cockle shells with barnacles and keel worm. Very low density of seed mussel. | Soft, muddy ground with stones and gravel. Dead mussel and cockle shells with barnacles, periwinkle and keel worm. Very low density of size mussel. | Soft, muddy ground with stones and gravel. Some dead mussel and cockle shell, periwinkle and keel worm. Some live mussel observed but very low density. | Harder ground with stones and gravel. Some dead mussel and cockle shell, periwinkle and keel worm. No live mussel or seed mussel. | Soft, muddy ground with stones and gravel. Some dead mussel and cockle shells only one live mussel seen, abundant periwinkle and keel worm. |

| Criteria                         | Sector 3                                                                                                                                                    | Sector 3                                                                                                                                                | Sector 4                                                                                                                                         | Sector 4                                                                                                                                                                             |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transects                        | 607                                                                                                                                                         | 608                                                                                                                                                     | 626                                                                                                                                              | 627                                                                                                                                                                                  |
| Seed mussel Present              | Yes                                                                                                                                                         | Yes                                                                                                                                                     | No                                                                                                                                               | No                                                                                                                                                                                   |
| Size of seed mussel              | 30-45 mm                                                                                                                                                    | 30-45 mm                                                                                                                                                | NA                                                                                                                                               | NA                                                                                                                                                                                   |
| Estimated % cover of seed mussel | <1%                                                                                                                                                         | 2%                                                                                                                                                      | NA                                                                                                                                               | NA                                                                                                                                                                                   |
| Density of seed mussel           | areas                                                                                                                                                       | areas                                                                                                                                                   | NA                                                                                                                                               | NA                                                                                                                                                                                   |
| Presence of size mussel          | Yes                                                                                                                                                         | Yes                                                                                                                                                     | No                                                                                                                                               | Yes                                                                                                                                                                                  |
| Size of mussel seen              | Unknown                                                                                                                                                     | Unknown                                                                                                                                                 | NA                                                                                                                                               | NA                                                                                                                                                                                   |
| Density of size mussel           | Very Low                                                                                                                                                    | Very Low                                                                                                                                                | NA                                                                                                                                               | Very Low                                                                                                                                                                             |
| Size of mussels (mixed/uniform)  | Mixed                                                                                                                                                       | Mixed                                                                                                                                                   | NA                                                                                                                                               | Uniform                                                                                                                                                                              |
| Dead shell present               | Yes                                                                                                                                                         | Yes                                                                                                                                                     | Yes                                                                                                                                              | Yes                                                                                                                                                                                  |
| Estimated % cover of dead shell  | 80%                                                                                                                                                         | 30%                                                                                                                                                     | 70%                                                                                                                                              | 10-15%                                                                                                                                                                               |
| Images                           | 42<br>                                                                    | 43<br>                                                               | 61<br>                                                       | 62<br>                                                                                           |
| Description                      | Firm muddy sandy/shelly ground. Numerous dead mussel and cockle shells. Very low density of seed and size mussel. Barnacles, periwinkles and some seaweeds. | Firm muddy sandy/shelly ground. Some dead mussel and cockle shells. Very low density of size and seed mussel. Barnacles, periwinkles and some seaweeds. | Firmer muddy sandy/shelly ground, a few dead mussel and abundant dead cockle shells. No seed or size mussel. Barnacles and abundant periwinkles. | Firm muddy sand and gravel. No seed mussel and very low density of size mussel. A few dead mussel shells, abundant dead cockle shells and live periwinkles, barnacles and keel worm. |

## Discussion

Overall the mussel bed area at Blyth has continued to decline since surveys began in 2015 with a steep decline from 2024 to 2026. It is now not possible to describe the area as a functioning mussel bed as the mussels present there are mostly single mussels or very small aggregations of less than five, spaced out across the whole area. There has been no small spat <30 mm for the past two years. The majority of the area appears to be dead shell in varying levels of cover with very few live mussel.

Since 2025 more mussel has been lost in all surveyed sectors, previous reports noted an increase in the proportion of juvenile (spat) and medium sized mussels in 2023 that had not led to an increase in mussels at the site and this still appears to be the case.

The beds at Blyth fail to meet the OSPAR criteria for classification as mussel bed habitats, given that mussel densities are vastly below 30% cover both within each sector and across all sectors. Definitions of intertidal blue mussel beds vary between regions for example in the Wadden Sea where 5% coverage and >25 m<sup>2</sup> constitutes a mussel bed, for Northern Ireland 30% cover and 2 m<sup>2</sup>, in Wales 30% cover and 10 m<sup>2</sup> is classed as a bed (J.L. Stounberg et al., 2024). Considering these definitions the beds at Blyth would still not meet the criteria of a mussel bed and Blyth has not met the OSPAR criteria since 2020.

### **Lack Of Recruitment**

Recruitment in mussel populations is known to be sporadic, occurring in unpredictable pulses (Seed & Suchanek, 1992), which is the case in the Blyth estuary in surveyed years, with higher recruitment occurring roughly every two years. However, in 2025 only sector 1 had 30-45 mm seed mussel present at around 5% cover and no spat was observed on the beds, this sector has now disappeared. In 2026 seed mussel was seen on sector 2 and 3, again at very low density. Spat mussels are known to preferentially settle among established adult mussel populations, and studies have demonstrated their avoidance of soft substrata which is present in some sectors of the estuary. Sector 2 had the softest, muddy ground and this is where we found the new small area of mussels though mostly attached to stones. Sector 3 and 4 had firmer coarse muddy ground where we would expect to find more mussel. The reduction in adult mussel cover in the estuary will be a contributing factor to the absence of spat observed since 2025 and the general decline of the mussel beds (McGrorty et al., 1990).

Persistent mussel beds are thought to be maintained by relatively low levels of sporadic recruitment (Mainwaring Tillin H. & Tyler-Walters H., 2014; McGrorty et al., 1990) and sporadic recruitment has been observed in recent years in the estuary. In 2021 surveys showed high

proportions of larval settlement and juvenile mussel (<5 mm) across all sectors, followed by a reduction of spat in 2022 (Harvey, 2022). In 2023 there was no spat observed but juvenile mussels were present and their estimated percentage cover had reduced from 25% in 2021 and 2022 to just 4% in 2023 (Harvey & Smart, 2023). In 2024 spat had increased from 2023 (Harvey et al., 2024) however in 2025 and 2026 no spat under 30 mm was observed at all. This suggests that juvenile mussels may not be surviving on sediments in the estuary and unable to grow into mature mussels that would become spawning stock. Recruitment on the intertidal does not appear to be able to counter the causes of decline and sustain the populations of mussel in the Blyth estuary suggesting that this UK BAP priority habitat is now functionally extinct on the littoral sediments here.

The walkover this year included some trees and manmade structures that have been submerged in the intertidal for some years which appear to have mussels growing on them (Figure 8).



**Figure 8** – Images of mussel on hard structures in the Blyth Estuary in 2026

This suggests that there is larvae in the water column but it is not settling on sediments in the estuary. In addition, there are reports that mussel is abundant on the floating pontoons and hard structures at Cambois in the north eastern part of the estuary. Outside of the estuary on Blyth beach there is mussel growing on some of the wooden groynes indicating spat is present in the wider area.

The reason mussel is doing better on wooden structures is unknown but could be due to a multitude of factors such as less exposure to benthic predators (e.g. starfish and crabs) that prey upon young mussels. Wooden structures provide a more stable surface for mussels to grow on than on shifting sediments, this has been noted in mussel aquaculture literature which indicates that surface complexity is attractive to mussels such as ropes, crevices, and potentially the preference for rough wood grain, and as well documented, their preference for established mussel beds (Carl et al., 2012).

Walkover inspections began in 2025 and these record the data listed in the methodology section, including images and descriptions of sediment types for each surveyed sector. In a sheltered estuary like the Blyth the preferred habitat would be established mussel beds. However, the decline of adult mussels combined with the presence of softer sediment may mean spat is struggling to settle as effectively on mud and sandy sediments as byssal threads may be covered by sediment therefore inaccessible (McGrorty et al., 1990).

### **Anthropogenic Impacts**

NIFCA monitor the estuary and have in place a voluntary 'Blyth Estuary Bait Collection Code of Conduct' which includes recommendations for mussel collection. Mussel collection is one of the many pressures that may have contributed to the decline of the beds at Blyth but NIFCA sighting data suggests that mussel collection has decreased in the estuary as there is very little mussel remaining to exploit. Only one person was confirmed to be collecting mussels in the estuary in October 2025 and there have been no other sightings since. Digging for worms on muddy sediment near the mussel beds and collection of peeler crabs from tyres is still seen frequently on low tides.

Further, anecdotal evidence suggests that development of the northern bank of the harbour and maintenance dredging activity taking place over the years may have impacted the hydrology of the river, shifting and potentially redistributing sediments, but there is no proven link.

Evidence suggests that mussel beds throughout Northumberland and further afield have seen a decline overall. Historically, mussel beds in Northumberland were more widespread and have gradually been lost over the years. A study by Lebour from 1906 showed widespread mussel beds

in all of the estuaries in Northumberland although the Blyth appeared to have similar problems as today with hand gathering pressure from fishermen, smothering from sediment and dredging.

A Newcastle University project in 2021 used Environment Agency data on water quality and mussel contaminants to better understand the causes of decline, and found significant correlations with the biocontaminants PBDE154 (a flame retardant), Dieldrin and Endrin (banned organochlorine pesticides) at the Lindisfarne mussel beds though the Blyth was not analysed (Richardson, 2021). Given the remote location of Lindisfarne compared to the industrial Blyth estuary, it is likely there is more contamination of the mussels in the Blyth which could be having an impact.

A joint study in 2024 by The Roslin Institute, St Abbs Marine Station and Natural England used mussel faeces from several UK populations to investigate parasites and pathogens using eDNA and whole-genome sequencing techniques. Results revealed the presence of *Klebsiella quasipneumoniae* in all declining populations of blue mussel. However, there was no indication of its pathogenicity on mussels and may be associated with water quality (Chapuis et al., 2025). Other bacterium found in mussels in The Blyth were *Tenacibaculum todarodis*, *Polaribacter pectinis*, and flavobacteriaceae bacterium uj101 all belonging to the flavobacterium family, some of which are implicated in fish mortality but again there is no evidence of mortality of shellfish exposed to these bacteria (Pellizer M, 2022).

In September 2025, Natural England and NIFCA collected a small number of mussels from the Blyth Estuary (north and south banks), Lindisfarne and Royal Quays Marina for Cefas to analyse mussel tissue for human pharmaceuticals. A range of compounds were detected in mussels from Northumberland, with antidepressants the most frequently identified at Blyth. Concentrations were much lower at Holy Island, which is consistent with the smaller local population and lower inputs of sewage/waste water in to the embayment. Further work is needed to determine whether these compounds have any adverse effects on mussel health or population dynamics (Maskrey, 2026;).

Despite similar declines at Holy Island, and the much lower concentrations of antidepressants suggest that this is unlikely to be the primary driver of the observed decline at either site.

The Blyth estuary has frequent sewage overflows in close proximity to the mussel beds and in 2025 there were 326 overflows lasting 2,214 hours (Northumbrian Water, 2025). The presence of pharmaceutical drugs in the mussels at Blyth may be linked to these sewage outputs causing the mussels to accumulate these drugs in their tissues, which could have contributed negatively to the health of the population over the years. Further investigations of the effects of sewage and human pharmaceuticals on *M. edulis* is recommended.

## Regional and Historical Mussel Health

In contrast to the declines in the Blyth estuary, blue mussels of all size classes, including spat are continuing to thrive in Royal Quays Marina in the River Tyne growing well on the floating pontoons and hard structures present there. Reports of numerous mussels in large numbers on the pontoons in the north east of the estuary at Cambois is promising meaning that there is likely to be larvae in the water column and that the water is suitable to feed the mussels.

In the UK, on the East coast of England, die-offs in The Wash have been observed since 2010. However, 2023 and 2024 saw a biomass increase potentially linked to increased rainfall and sewage input. In Scotland, a study has shown the decline of intertidal blue mussels on rocky shores mainly along the southwestern and southeastern coasts, only finding healthy populations on the exposed island coasts of Orkney and Shetland (Burrows et al., 2025). There is another ongoing study in Scotland into the decline of blue mussel beds on muddy sediments that is currently unpublished.

Overall, there has been a gradual decrease in the population of blue mussels in the North Atlantic region, with considerable variation across different localities (Baden et al., 2021). Declines in extent and biomass of mussel beds has been observed in the Greater North Sea including in Germany, Denmark and the Netherlands (OSPAR, 2023). Mussel bed habitat is thought to have reduced by over 50% in the past 50 years (Heard et al., 2026)

The drivers of mussel bed decline at Blyth remain uncertain and survey evidence indicates that juvenile mussels have been unable to settle and/or survive to larger size classes on the intertidal beds, most likely because the remaining patches are now too sparse and provide insufficient adult mussel matrix for successful settlement and growth. The Blyth mussel beds functionally extinct on intertidal mixed and sandy sediments, although mussels continue to persist locally on hard structures.

## Further Study

NIFCA intends to continue annual inspections of the Blyth mussel beds; however, the monitoring approach may need to be reviewed for 2027. An alternative would be an annual walkover of the historic bed areas to assess if any bed has returned in the first instance, with a return to targeted inspections and full surveys should evidence of recovery emerge.

The Mussel Restoration Network expert group in combination with NIFCA is working to identify evidence gaps related to blue mussel decline in the UK and explore restoration possibilities.

NIFCA have also been in discussions with Cefas with regards to their coastal health and livelihoods programme with a view to investigating factors contributing to the decline in Northumberland and further afield.

## Conclusion

The Blyth mussel beds have declined across all metrics assessed in 2026. While the precise causes of this decline remain unclear, ongoing and planned studies locally and nationally are improving understanding of mussel declines and will help guide future investigations into the drivers affecting the Blyth estuary.

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