

Pots, Traps & Creels Interactions with Mussel Bed on Boulder and Cobble Skears

1. Introduction

The Assessing Welsh Fishing Activities (AWFA) Project is a structured risk-based approach to determining impacts from current and potential fishing activities (undertaken from licensed and registered commercial fishing vessels), upon the features of European marine sites (EMS) in Wales.

Further details of the AWFA Project, and all completed assessments to date, can be found on the [AWFA website](#).

The methods and process used to classify the risk of interactions between fishing gears and EMS features, as either purple (high), orange (medium) or green (low) risk, can be found in the AWFA Project Phase 1 outputs: [Principles and Prioritisation Report](#) and resulting [Matrix spreadsheet](#).

2. Assessment summary

<p>Assessment Summary: Pots, Traps & Creels Interactions with Mussel Bed on Boulder and Cobble Skears</p>	<p><u>Assessment of impact pathway 1: Physical damage to a designated habitat feature:</u></p> <p>No studies were found that directly measured or estimated physical impacts of potting on Mussel Beds on Boulder and Cobble Skears. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Indirect evidence, expert judgement and indicative MarLIN sensitivity assessments suggests that the physical impacts from pots, weights or anchors making contact with Subtidal Mussel Bed on Rock habitat could cause damage to the biogenic substrate.</p> <p><u>Assessment of impact pathway 2: Damage to a designated habitat feature via removal of, or other detrimental impact to, typical species:</u></p> <p>No studies were found that directly or indirectly measured or estimated impacts of potting on Mussel Beds on Boulder and Cobble Skears or similar habitats. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Expert judgement and indicative MarLIN sensitivity assessments suggests that the impacts from pots, weights or anchors making contact with Mussel Beds on Rock habitat could cause damage to the biological communities.</p> <p>Confidence in this assessment is medium (please see section 8).</p>
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3. Feature description

<p>Feature Description: Mussel Bed on Boulder and Cobble Skears</p>	<p>Juvenile mussels (spat) settle on a variety of intertidal and subtidal seabed types including sediments, mixtures of pebbles, cobbles and boulders, through to bedrock (JNCC, 2015a). Under certain environmental conditions high densities of mussels persist for multiple years, binding together substrates to form mussel beds (JNCC, 2015b).</p> <p>Mussel Beds on Boulder and Cobble Skears is a mixed substrata habitat comprising dense aggregations of mussels covering boulders and cobbles (rock component of 10-49%) surrounded by and protruding from sediments, including muddy sands and mixtures of pebbles and shells, sands and gravels (NRW, 2018a; NWIFCA, 2016).</p> <p>This habitat is predominantly intertidal, occasionally extending into the shallow subtidal. However, as potting does not occur intertidally this feature description only includes subtidal elements of the feature. Beds are formed by the blue mussel, <i>Mytilus edulis</i> (NRW, 2018a), and include a single subtidal biotope described below. Additional biotopes less frequently present as part of this habitat, are described in Annex 1, as are sensitivities to relevant pressures. See Annex 1 for 'biotope' definition too.</p> <p><i>Mytilus edulis</i> beds on sublittoral sediment (SS.SBR.SMus.MytSS) is found in fully marine or outer estuarine shallow sublittoral mixed sediment habitat characterised by beds of blue mussels (JNCC, 2015c). Typical species primarily comprise the blue mussels that form the biogenic reef habitat (Tillin <i>et al.</i>, 2016). Other common and characterising species include anemones (<i>Urticina feline</i>), nemertean, polychaete worms (<i>Harmothoe</i> spp., <i>Kefersteinia cirrata</i> and <i>Heteromastus filiformis</i>), amphipods (<i>Gammarus salinus</i>), other crustaceans e.g. European spider crab (<i>Maja squinado</i>), gastropods e.g. dog and common whelks (<i>Nucella lapillus</i> and <i>Buccinum undatum</i>), common starfish (<i>Asterias rubens</i>) and occasionally red algae (JNCC, 2015a; 2015b; 2015c).</p>
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4. Gear description

<p>Gear Description: Pots, Traps & Creels</p>	<p>Pots, traps and creels (pots) are rigid cage-like structures designed to capture fish or shellfish species living on or near the seabed (FAO, 2001; Seafish, 2020a). They typically comprise one or more funnel-shaped entrances</p>
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that guide fish or shellfish into one or more easily accessed and usually baited compartments (FAO, 2001; Seafish, 2020a).

UK pot designs, sizes and construction materials vary geographically and according to target species, environmental conditions and fisher's preference (Seafish, 2020a). Top-entry inkwell pots (0.28-0.47 m² footprint) and side or top-entry parlour pots or 'D-creels' (0.24-0.55 m² footprint) weighing 15-20kg are used to catch crab or lobster and are made from wire, rubber, metal and netting (Gravestock, 2018; Cornwall Creels, 2020; Seafish, 2020a). Solid sided 20-30 litre rectangular containers with holes in the sides (0.09-0.14 m² footprint), a mesh funnel at the top, a concrete bottom and weighing 6-12kg are used to target whelks (Channel Pots, 2020; Seafish, 2020c). Lightweight plastic tubular pots with small-mesh sides and funnel entries at either end are used to target prawns (Coastal Nets, 2020; Seafish, 2020a).

Pots can be fished individually or in strings (fleets), where several pots are attached to a length of rope, laid along the seabed and marked at either end with a rope to the surface and a marker buoy (Seafish, 2020a). The number of pots in a fleet will depend on factors including pot design, target species, habitat fished, fisher's preference, vessel size and the available deck space to store the pots once they have been hauled (Seafish, 2020b).

Fishers can have multiple strings of pots deployed at any one time, hauled following a soak time of 24-48 hours (Seafish, 2020a). Multi-compartment 'parlour' pots generally retain catch for longer periods making them more suitable for longer soak times, whereas single compartment 'inkwell' pots are subject to more escapees during longer soak times (Swarbrick and Arkley, 2002).

Fleets of lighter traps, such as prawn creels, use anchors or weights at either end to reduce movement in tides (Seafish, 2020a). Other pots are designed to be heavy or utilise concrete-weighted end-pots that replace the need for anchors or weights (Seafish, 2020b). Strings of pots are deployed (or shot) one at a time whilst the boat slowly moves over the target fishing ground (Seafish, 2020a). Single pots are generally set in rocky inshore areas and can be bounced along the seabed until they contact rock or reef (FAO, 2001).

Baited pots can capture undersized target species, non-target invertebrates and occasionally fish species (Pantin *et al.*, 2015). However, the use of appropriate-sized mesh coverings, or the addition of large-mesh panels or escape-gaps, can ensure smaller individuals and non-target species are able to escape (Seafish, 2020a).

5. Assessment of impact pathways

<p>Assessment of impact pathway 1</p>	<p>1. Physical damage to a designated habitat feature (Physical Impacts)</p> <p>No studies were found that directly measured or estimated physical impacts of potting on Mussel Beds on Boulder and Cobble Skears or any similar mussel bed habitat. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat.</p> <p>Indirect studies highlight that abrasion could result in small areas of mussel bed being damaged or dislodged (Sørensen <i>et al.</i>, 2015), with recovery dependant on the frequency of the interaction and the area of impact (Tillin <i>et al.</i>, 2016). When cleared patches occur in blue mussel beds, rapid recovery is possible following a period of good recruitment (Holt <i>et al.</i>, 1998). However, damaged mussels can attract scavengers which could increase predation on undamaged mussels (Tillin <i>et al.</i>, 2016).</p> <p>Assessments based on expert knowledge suggest that potting is of limited concern to Mussel Bed on Boulder and Cobble Skears (Roberts <i>et al.</i>, 2010; Hall <i>et al.</i>, 2008; JNCC and NE, 2011).</p> <p>If potting were to occur across Mussel Bed on Boulder and Cobble Skears, the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause minor surface disturbance and abrasion (JNCC and NE, 2011; Walmsley <i>et al.</i>, 2015). Where pots are fixed in strings, the retrieval of pots, or incidences of rough weather, could lead to ropes, pots and anchors dragging over or entangling seabed structures, potentially causing physical damage or abrasion to the seabed (MacDonald <i>et al.</i>, 1996; Roberts <i>et al.</i>, 2010; JNCC and NE, 2011). During spring tides, strong wind and large waves, unintentional movement of pots and any associated seabed abrasion could be increased (Eno <i>et al.</i>, 2001; Stephenson <i>et al.</i>, 2015).</p> <p>In addition to the abiotic physical substrate, the Subtidal Mussel Bed on Rock habitat is comprised of a biogenic physical structure created by the mussels. Subtidal Mussel Bed on Rock biotopes have been assessed to a range of pressures by MarLIN (Tyler-Walters <i>et al.</i>, 2018). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for Subtidal Mussel Bed on Rock biotopes shown in Annex 1 conclude: both blue mussel (<i>M. edulis</i>) and <i>M. discors</i> beds on rock as have a 'medium' sensitivity to abrasion and penetration (Tillin <i>et al.</i>, 2015; Tillin <i>et al.</i>, 2016).</p> <p>Depending on the footprint and the intensity of potting, it is possible that the physical impacts from pots, weights or anchors making contact with Subtidal Mussel Bed on Rock habitat could cause damage to the biogenic substrate. The recruitment potential of blue mussels and <i>M. discors</i>, could allow rapid recovery if significant</p>
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	<p>parts of the original bed remain, with recovery to pre-impact levels expected within 2-10 years depending on the severity of the impact (Tillin <i>et al.</i>, 2015; Tillin <i>et al.</i>, 2016).</p>
<p>Assessment of impact pathway 2</p>	<p>2. Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological species (Impacts on Biological Communities)</p> <p>No studies were found that directly or indirectly measured or estimated physical impacts of potting on typical species of Mussel Beds on Boulder and Cobble Skears or similar habitat. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat.</p> <p>Assessments based on expert knowledge suggest that potting is of limited concern to Mussel Bed on Boulder and Cobble Skears (Roberts <i>et al.</i>, 2010; Hall <i>et al.</i>, 2008; JNCC and NE, 2011).</p> <p>Mobile species are less vulnerable to physical damage from potting compared to sessile epifauna (Gall <i>et al.</i>, 2020). Echinoderms (<i>Asterias rubens</i> and <i>Echinus esculentus</i>) rolled or were gently moved away from the pot impact zone by the pressure wave preceding the moving pot (Gall <i>et al.</i>, 2020). Assessments by Langmead <i>et al.</i> (2010) classified the soft coral ‘dead-man’s fingers’ (<i>A. digitatum</i>), found on horse mussel beds, as ‘fragile’ in relation to physical impacts, whilst blue mussel, the boring sponge (<i>Cliona celata</i>) and anemones (e.g. <i>Urticina</i> spp.) were classified as having ‘intermediate’ vulnerability to physical impact.</p> <p>If potting were to occur across Mussel Bed on Boulder and Cobble Skears, the general physical impacts from static gear, including pots, weights or anchors, making contact with the boulder and cobble skears during gear deployment could cause surface disturbance and abrasion to biological communities (JNCC and NE, 2011; Walmsley <i>et al.</i>, 2015). Where pots are fixed in strings, the retrieval of pots, or incidences of rough weather, could lead to ropes, pots and anchors dragging over or entangling the boulder and cobble skears structure, potentially causing physical damage or abrasion to the biological communities (MacDonald <i>et al.</i>, 1996; Roberts <i>et al.</i>, 2010; JNCC and NE, 2011; Gall <i>et al.</i>, 2020). During spring tides, strong wind and large waves may cause unintentional movement of pots and any associated seabed abrasion could be increased (Eno <i>et al.</i>, 2001; Sørensen <i>et al.</i>, 2015; Stephenson <i>et al.</i>, 2015).</p> <p>Mussel Bed on Boulder and Cobble Skear biotopes have been assessed to a range of pressures by MarLIN (Tillin <i>et al.</i>, 2016). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for Mussel Bed on Boulder and Cobble Skear biotopes shown in Annex 1 conclude: the three biotopes have a medium sensitivity to abrasion and penetration.</p>

	<p>Please refer to the MarLIN website which provides further information about the assessment methodology and the supporting evidence (www.marlin.ac.uk/).</p> <p>Depending on the footprint and the intensity of potting it is possible that the impacts from pots, weights or anchors making contact with Mussel Beds on Boulder and Cobble Skears could cause damage to the biological communities.</p>
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6. SACs where the habitat occurs as a component of a designated feature

<p>Lleyn Peninsula and the Sarnau SAC</p>	<p>The Lleyn Peninsula and the Sarnau SAC contains examples of the Mussel Beds on Boulder and Cobble Skears habitat, as evidenced by data and relevant literature (NRW, 2018b). Please see the latest SAC feature condition assessment for information on the location and condition of features.</p> <p>The following features contain Mussel Beds on Boulder and Cobble Skears habitat within the Lleyn Peninsula and the Sarnau SAC:</p> <ol style="list-style-type: none"> 1. Estuaries 2. Reefs
<p>Menai Strait and Conwy Bay SAC</p>	<p>The Menai Strait and Conwy Bay SAC contains examples of the Mussel Beds on Boulder and Cobble Skears habitat, as evidenced by data and relevant literature (NRW, 2018a). Please see the latest SAC feature condition assessment for information on the location and condition of features.</p> <p>The following features contain Mussel Beds on Boulder and Cobble Skears habitat within the Menai Strait and Conwy Bay SAC:</p> <ol style="list-style-type: none"> 1. Reefs 2. Large Shallow Inlets and Bays
<p>Carmarthen Bay and Estuaries SAC</p>	<p>The Carmarthen Bay and Estuaries SAC contains examples of the Mussel Beds on Boulder and Cobble Skears habitat, as evidenced by data and relevant literature (NRW, 2018c). Please see the latest SAC feature condition assessment for information on the location and condition of features.</p> <p>The following features contain Mussel Beds on Boulder and Cobble Skears habitat within the Carmarthen Bay and Estuaries SAC:</p> <ol style="list-style-type: none"> 1. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge) 2. Large Shallow Inlets and Bays

	3. Estuaries
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7. Evidence Gaps

- Direct studies to measure the impacts from potting on Mussel Beds on Boulder and Cobble Skears habitat.
- A study comparing the impacts from different types of pots and methods of potting.
- Map the distribution and extent of the AWFA Mussel Beds on Boulder and Cobble Skears habitat.

8. Confidence assessment

The confidence score is the sum of scores from three evidence components: quality, applicability and agreement. These are qualitatively assessed as high, medium or low using the most appropriate statements in the table below, and these are numerically represented as scores of 3, 2, or 1 respectively.

A total confidence score of 3 – 5 represents low confidence, 6 or 7 shows medium confidence and 8 or 9 demonstrates high confidence in the evidence used in the assessment.

This assessment scores 6, representing medium confidence in the evidence.

Confidence	Evidence quality	Evidence applicability	Evidence agreement
High	Based on more than 3 recent and relevant peer reviewed papers or grey literature from established agencies.	Based on the fishing gear acting on the feature in the UK.	Strong agreement between multiple (>3) evidence sources.
Medium	Based on either relevant but older peer reviewed papers or grey literature from less established agencies; or based on only 2-3 recent and relevant peer reviewed evidence sources. Score 2.	Based on similar fishing gears, or other activities with a similar impact, acting on the feature in the UK. Score 2.	Some disagreement but majority of evidence agrees. Or fewer than 3 evidence sources used. Score 2.
Low	Based on either less relevant or older grey literature from less established agencies; or based on only 1 recent and relevant peer reviewed evidence source.	Based on similar fishing gears acting on the feature in other areas, or the fishing gear acting upon a similar feature in the UK.	Little agreement between evidence.

N.B. When evidence is indirect the evidence quality and applicability will be capped to medium, to ensure that direct evidence gaps are captured in this approach.

9. References

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Annex 1: Welsh biotopes included in the AWFA potting and Mussel Bed on Boulder and Cobble Skears assessment

The term 'biotope' refers to both the physical environment (e.g. substrate) and the unique set of species associated with that environment (Tyler-Walters and Jackson, 1999). Biotopes are defined by the JNCC Marine Habitat Classification for Britain and Ireland Version 15.03 (<https://mhc.jncc.gov.uk/>) and sensitivities to abrasion and penetration are from the Marine Evidence based Sensitivity Assessment (MarESA) (https://www.marlin.ac.uk/sensitivity/sensitivity_rationale). The MarESA approach considers a range of pressures and benchmarks for all biotopes using all available evidence and expertise (Tyler-Walters *et al.*, 2018). The MarESA sensitivity to abrasion and penetration assessments highlighted in the table below consider any type of potential abrasion to the surface substratum and associated biology and do not specifically refer to potting activity (Tyler-Walters *et al.*, 2018). High sensitivity indicates a significant loss of species combined with a recovery time of more than 10 years. Medium sensitivity indicates either significant mortality combined with medium recovery times (2-10 years) or lower mortality with recovery times varying from 2 to 25+ years. Whilst a low sensitivity indicates a full recovery within 2 years.

Littoral sediments	MarESA sensitivity to abrasion	MarESA sensitivity to penetration
LS.LBR.LMus.Myt	Medium	Medium
LS.LBR.LMus.Myt.Mx	Medium	Medium
Sublittoral sediments		
SS.SBR.SMus.MytSS	Medium	Medium

Note: where the substratum % cover of cobbles and/or boulders is low (around or lower than 10%), these can also be part of the 'mussel beds on mixed and sandy sediments' habitat.