

# Pots, Traps & Creels Interactions with Brittlestar Beds

## 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><b>Assessment Summary:</b></p> <p><b>Pots, Traps &amp; Creels Interactions with Brittlestar Beds</b></p>	<p><b><u>Assessment of impact pathway 1: Physical damage to a designated habitat feature:</u></b></p> <p>No studies were found that directly or indirectly measured or estimated impacts of potting on Brittlestar Beds or similar habitats. Expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots, weights or anchors making contact with Brittlestar Beds could cause physical damage to the biogenic substrate (e.g. structurally modifying the brittlestar mass).</p> <p><b><u>Assessment of impact pathway 2: Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities:</u></b></p> <p>No studies were found that directly or indirectly measured or estimated impacts of potting on Brittlestar Beds or similar habitats. Expert judgement and indicative MarLIN sensitivity assessments suggests that the impacts from pots, weights or anchors making contact with Brittlestar Beds habitat could cause damage to the biological communities.</p> <p>Confidence in this assessment is <b>low</b> (please see section 8).</p>
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### 3. Feature description

<p><b>Feature Description:</b></p> <p><b>Brittlestar Beds</b></p>	<p>Brittlestars may form dense beds consisting of hundreds or thousands of individuals as epifauna on rock or sedimentary substrate (MarLIN, 2020). The differences between the biotopes (see Annex 1 for definition) found in Wales tend to be related to the substrate they lie on and the species present. The most common Brittlestar Beds biotope found around the Welsh coast is the <i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> Brittlestar Beds on sublittoral mixed sediment [SS.SMx.CMx.OphMx].</p> <p>The SS.SMx.CMx.OphMx biotope can be patchy in distribution but may extent to hundreds of square metres over the sublittoral mixed sediment. The brittlestars tend to be large adults or newly settled juveniles, with intermediate sized individuals tending to live in nearby rock habitats. Similar, suspension feeding organisms occupy the same biotope, such as the octocoral <i>Alcyonium digitatum</i>, the anemone <i>Metridium senile</i> and the hydroid <i>Nemertesia antennina</i> are present mainly on rock outcrops or boulders protruding above the brittlestar-covered substratum. The large anemone <i>Urticina felina</i> may be quite common. The larger mobile megafauna found related to this biotope include starfish <i>Asterias rubens</i>, <i>Crossaster papposus</i> and <i>Luidia ciliaris</i>, the urchins <i>Echinus esculentus</i> and <i>Psammechinus miliaris</i>, edible crabs <i>Cancer pagurus</i>, swimming crabs <i>Necora puber</i>, <i>Liocarcinus spp.</i>, and hermit crabs <i>Pagurus bernhardus</i>. Regardless of the dense biota on the seabed surface, a diverse range of infauna still live within the sediment (EEA, 2019a).</p> <p>The second Brittlestar Bed biotope [CR.MCR.EcCr.FaAlCr.Bri] is less common in Wales than the first and regarded as “Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock”. Examples of this biotope may be found in the Lleyn Peninsula and the Sarnau SAC and Pembrokeshire Marine SAC and tends to be dominated by <i>Ophiothrix fragilis</i> with a few individuals of <i>Ophiocomina nigra</i> amongst them. Only robust hydroids such as <i>Abietinaria abietina</i>, <i>Alcyonium digitatum</i> and bryozoan crusts such as <i>Parasmittina trispinosa</i> are able to tolerate the significant smothering effect from the dense mat of brittlestars in this biotope (EEA, 2019b). Some of the larger megafauna found here include: <i>Echinus esculentus</i>, <i>Asterias rubens</i>, <i>Pagurus bernhardus</i>, <i>Anapagurus hyndmanni</i>, <i>Gibbula cineraria</i>, <i>Urticina felina</i>, <i>Pododesmus patelliformis</i> and <i>Ciona intestinalis</i> (JNCC, 2015).</p>
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## 4. Gear description

<b>Gear Description: Pots, Traps &amp; Creels</b>	<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 that guide fish or shellfish into one or more easily accessed and usually baited compartments (FAO, 2001; Seafish, 2020a).</p> <p>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 m<sup>2</sup> footprint) and side or top-entry parlour pots or 'D-creels' (0.24-0.55 m<sup>2</sup> 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 m<sup>2</sup> 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).</p> <p>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).</p> <p>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 &amp; Arkley, 2002).</p> <p>Strings 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).</p> <p>Baited pots can capture undersized target species, non-target invertebrates and occasionally fish species (Pantin <i>et al.</i>, 2015). However, the use of appropriate-sized mesh coverings, or the addition of large-mesh</p>
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	panels or escape-gaps, can ensure smaller individuals and non-target species are able to escape (Seafish, 2020a).
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## 5. Assessment of impact pathways

<p><b>Assessment of impact pathway 1</b></p>	<p><b>1. Physical damage to a designated habitat feature (Physical Impacts):</b></p> <p>No studies were found that directly or indirectly measured or estimated impacts of potting on Brittlestar Beds or similar habitats. One study was found which considered the density of the brittlestar <i>Asteronyx loveni</i> in relation to potting (Adey, 2007). This study is not considered relevant for this assessment, as <i>A. loveni</i> does not aggregate in dense beds but is found individually wrapped around sea pens (Adey, 2007).</p> <p>Brittlestars are known to regenerate arms if they become lost or damaged and are considered to be of medium fragility and recoverability on the sensitivity index scale (MacDonald <i>et al.</i>, 1996).</p> <p>If potting were to occur across Brittlestar Beds habitats, the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause surface disturbance and abrasion (JNCC &amp; 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 &amp; NE, 2011). 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>In addition to the abiotic physical substrate, the Brittlestar Bed habitat is comprised of a biogenic physical structure created by the brittlestars. Brittlestar Bed biotopes have been assessed to a range of pressures by MarLIN (De-Bastos and Hill, 2020). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration to the structure of the habitat. MarLIN abrasion and penetration sensitivity assessments for Brittlestar Bed biotopes shown in Annex 1 conclude: both biotopes have a medium sensitivity to abrasion and a medium or 'not relevant' sensitivity to penetration.</p> <p>Please refer to the MarLIN website which provides further information about the assessment methodology and the supporting evidence (<a href="http://www.marlin.ac.uk/">www.marlin.ac.uk/</a>).</p>
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	<p>Depending on the footprint and the intensity of potting it is likely that the impacts from pots, weights or anchors making contact with Brittlestar Beds habitats could cause physical damage to the biogenic substrate (e.g. structurally modifying the brittlestar mass).</p>
<p><b>Assessment of impact pathway 2</b></p>	<p><b>2. Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities (Impacts on Biological Communities):</b></p> <p>No studies were found that directly or indirectly measured or estimated the impacts of potting on biological communities of Brittlestar Beds or similar habitats. One study was found which considered the density of the brittlestar <i>Asteronyx loveni</i> in relation to potting (Adey, 2007). This study is not considered relevant for this assessment, as <i>A. loveni</i> does not aggregate in dense beds but is found individually wrapped around sea pens (Adey, 2007).</p> <p>Brittlestars are known to regenerate arms if they become lost or damaged and are considered to be of medium fragility and recoverability on the sensitivity index scale (MacDonald <i>et al.</i>, 1996).</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>) 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).</p> <p>UK experimental potting studies have reported potting has some impact on biological communities, of subtidal rock habitats including habitats with fragile organisms such as branching sponges, the bryozoans and the soft coral (<i>Alcyonium digitatum</i>) (Hoskin, 2009; Coleman <i>et al.</i>, 2013; Haynes <i>et al.</i>, 2014; Vance &amp; Ellis, 2016; Rees <i>et al.</i>, 2021). Species found within brittlestar bed communities are similar to those associated with bedrock habitat, such as the soft coral <i>Alcyonium digitatum</i>, although, the density and diversity may vary due to smothering by the brittlestars (De-Bastos and Hill, 2020). Up to 32% of epibiota were damaged from potting within the haul impact zone, which mainly included the <i>A. digitatum</i> (Gall <i>et al.</i>, 2020). Several researchers also acknowledge the risk of cumulative damage, especially to sensitive fragile species, from repeated impacts and higher intensities of potting (Hartnoll, 1998; Roberts <i>et al.</i>, 2010; Coleman <i>et al.</i>, 2013; Walmsley, <i>et al.</i>, 2015; Rees, <i>et al.</i>, 2019; Rees <i>et al.</i>, 2021).</p> <p>If potting were to occur across Brittlestar Beds habitats the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause surface disturbance and abrasion to the biological communities (JNCC &amp; 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 biological communities (MacDonald <i>et al.</i>, 1996; Roberts <i>et al.</i>, 2010; JNCC &amp; NE, 2011; Gall, 2020). During spring tides,</p>

	<p>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>Brittlestar bed biotopes have been assessed to a range of pressures by MarLIN (De-Bastos and Hill, 2020). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration to the structure of the habitat. MarLIN abrasion and penetration sensitivity assessments for Brittlestar Bed biotopes shown in Annex 1 conclude: both biotopes have a medium sensitivity to abrasion and a medium or ‘not relevant’ sensitivity to penetration.</p> <p>Please refer to the MarLIN website which provides further information about the assessment methodology and the supporting evidence (<a href="http://www.marlin.ac.uk/">www.marlin.ac.uk/</a>).</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 Brittlestar Beds biotopes 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><b>Lleyn Peninsula and the Sarnau SAC</b></p>	<p>The Lleyn Peninsula and the Sarnau SAC contains examples of the brittlestar bed habitat, as evidenced by data and relevant literature (NRW, 2018a). Please see the latest <a href="#">SAC feature condition</a> assessment for information on the location and condition of features.</p> <p>The following features contain brittlestar bed habitat within the Lleyn Peninsula and the Sarnau SAC:</p> <ol style="list-style-type: none"> <li>1. Reefs</li> </ol> <p>Brittlestar Beds are considered to be ephemeral, as they are a mobile and biogenic community. Ephemeral brittlestar bed communities can therefore move around on a seasonal and year to year basis.</p>
<p><b>Pembrokeshire Marine SAC</b></p>	<p>The Pembrokeshire Marine SAC contains examples of the brittlestar bed habitat, as evidenced by data and relevant literature (NRW, 2018b). Please see the latest <a href="#">SAC feature condition</a> assessment for information on the location and condition of features.</p> <p>The following features contain brittlestar bed habitat within the Pembrokeshire Marine SAC:</p> <ol style="list-style-type: none"> <li>1. Reefs</li> <li>2. Large Shallow Inlets and Bays</li> </ol>

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## 7. Evidence Gaps

- Direct studies to measure the impacts from potting on Brittlestar Beds and associated biological communities.
- A study comparing the impacts from different types of pots and methods of potting.

## 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 3, representing low confidence in the evidence.**

<b>Confidence</b>	<b>Evidence quality</b>	<b>Evidence applicability</b>	<b>Evidence agreement</b>
<b>High</b>	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.
<b>Medium</b>	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.	Based on similar fishing gears, or other activities with a similar impact, acting on the feature in the UK.	Some disagreement but majority of evidence agrees. Or fewer than 3 evidence sources used.
<b>Low</b>	<b>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.</b> <b>Score 1.</b>	<b>Based on similar fishing gears acting on the feature in other areas, or the fishing gear acting upon a similar feature in the UK.</b> <b>Score 1.</b>	<b>Little agreement between evidence.</b> <b>Score 1.</b>



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## Annex 1: Welsh biotopes included in the AWFA potting and Brittlestar Beds 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](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.

<b>Biotope Components</b>	<b>MarESA sensitivity to abrasion</b>	<b>MarESA sensitivity to penetration</b>
CR.MCR.EcCr.FaAlCr.Bri	Medium	Not relevant
SS.SMx.CMx.OphMx	Medium	Medium