Pots, Traps & Creels Interactions with *Sabellaria spp*. Reef

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

Assessment Summary: **Pots, Traps & Creels** **Interactions with** ***Sabellaria spp*. Reef**	**Assessment of impact pathway 1: Physical damage to a designated habitat feature:** No studies were found that directly or indirectly measured or estimated impacts of potting on *Sabellaria spp.* Reef 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 suggest that the impacts from pots, weights or anchors making contact with subtidal *Sabellaria spp.* Reef could cause damage to the biogenic substrate (e.g. structurally breaking up the reef structure). **Assessment of impact pathway 2: Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities:** No studies were found that directly or indirectly measured or estimated impacts of potting on the biological communities of *Sabellaria spp*. Reef habitat 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 suggest the biological impacts from pots, weights or anchors making contact with subtidal *Sabellaria spp.* Reef could cause damage to the subtidal biological communities. Confidence in this assessment is **low** (please see section 8).

3. Feature description

Feature Description: ***Sabellaria spp*. Reef**	This feature is comprised of two different polychaetes: Honeycomb worm (*Sabellaria alveolata*) and ross worm (*Sabellaria spinulosa*). (See Annex 1 for Biotope description and definition). 1. Honeycomb worm *Sabellaria alveolata* The Honeycomb worm habitat can be separated into two biotopes – • SS.SBR.PoR.SalvMx - *Sabellaria alveolata* on variable salinity sublittoral mixed sediment • LS.LBR.Sab.Salv - *Sabellaria alveolata* reefs on sand-abraded eulittoral rock *Sabellaria alveolata* is a frequently gregarious segmented worm that builds tubes from sand or shell fragments. It is typically found on the bottom third of the shoreline but also in the shallow sub-tidal (Jackson, 2008), generally in exposed and moderately exposed areas. Tubes are often densely aggregated forming a honeycomb pattern, they may form large reefs up to several metres across and a metre deep. Open coast reefs are found on hard substrata on exposed and moderately exposed coasts, with moderate to considerable water movement where sand is available for tube building. Cunningham *et al* (1984) reported that actively growing *Sabellaria* colonies are able to outcompete all other littoral species for space. Cunningham noted that young sheets of *Sabellaria alveolata* may reduce the diversity of shores by reducing the number of crevices available, but as the sheets get older and break up the range of habitats provided increases (UK Marine Centre). *Sabellaria alveolata* reefs undergo cycles of development and decay over a period of a few years. Although reefs may come and go - areas that are good for *Sabellaria alveolata* tend to remain so. *Sabellaria alveolata* appear to favour warmer winter temperatures and are often associated with cooling water discharges (Bamber & Irving, 1997) but growth is inhibited below 5°C (Jackson, 2008). Spawning occurs each July but recruitment levels vary considerably from year to year. Larvae spend between 6 weeks and 6 months as plankton in the water column (Bamber & Irving, 1997). Most *Sabellaria alveolata* individuals have a lifespan of 3 to 5 years but there are records of them reaching 7 to 9 years old (Jackson, 2008). 2. Ross worm (*Sabellaria spinulosa)* SS.SBR.PoR.SspiMx - *Sabellaria spinulosa* on stable circalittoral mixed sediment.

	The tube-building polychaete *Sabellaria spinulosa* is found at high abundances on mixed sediment. These species typically form agglomerations of tubes creating a low lying matrix of sand, gravel, mud and tubes on the seabed. High densities of *Sabellaria spinulosa* have been observed in a variety of forms. In some location's tubes do not stand particularly proud of the surface even though the worm is abundant. These have been described as crusts or sheets but this habitat would not normally be classified as biogenic reef. The simplest definition of *Sabellaria spinulosa* as 'reef' in the context of the Habitats Directive (Council Directive 92/43/EEC) is considered to be an area of *Sabellaria spinulosa* which is elevated from the seabed and has a large spatial extent (Gubbay, 2007). *Sabellaria spinulosa* will consolidate the sediment and allow other species not found in adjacent habitats to settle, leading to a diverse community of epifaunal and infauna species. The matrix of various tubes and other erect structures will trap sediment providing food for deposit feeders. The trapped sediment also means that the biotope will be composed of habitats similar to both sedimentary and hard substratum environments, thereby increasing the number of potential niches. The aggregation provides shelter and protection for small species in an otherwise exposed sedimentary landscape. The development of these reefs is assisted by the settlement behaviour of larval *Sabellaria* which are known to selectively settle in areas of suitable sediment and particularly on existing *Sabellaria* tubes (Tait & Dipper, 1998; Wilson, 1970). *Sabellaria spinulosa* requires only a few key environmental factors for survival in UK waters. Most important seems to be a good supply of sand grains for tube building, put into suspension by strong water movement from either tidal currents or wave action (Jackson & Hiscock, 2008). *Sabellaria spinulosa* also appears to be very tolerant of polluted conditions (JNCC, 2016). It should be noted that the *Sabellaria spinulosa* reefs have a dynamic nature and can colonise, evolve and degrade rapidly.

4. Gear description

Gear Description: Pots, Traps & Creels	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). 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^2

	footprint) and side or top-entry parlour pots or 'D-creels' (0.24-0.55 m^2 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^2 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 & Arkley, 2002). 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). 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

<table>
<tr><td>Assessment of impact pathway 1</td><td>1. Physical damage to a designated habitat feature (Physical Impacts)

No studies were found that directly measured or estimated impacts of potting on Sabellaria spp Reef. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat.

Subject to the intensity of the activity, assessments based on expert knowledge suggest that the structure of subtidal Sabellaria spp. Reef is of low to medium sensitivity to the potential impacts from static gear (Walmsley et al., 2015; Hall et al., 2008; Holt et al., 1998; Gibb et al., 2014).

If potting were to occur across subtidal Sabellaria spp. Reef, the general impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause surface disturbance and abrasion (JNCC & NE, 2011; Walmsley et al., 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 biogenic reef (MacDonald et al., 1996; Roberts et al., 2010; JNCC & 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 et al., 2001; Sørensen et al., 2015; Stephenson et al., 2015).

In addition to the abiotic physical substrate, the Sabellaria spp. Reef habitat contains the worms that create the structure. Sabellaria spp. Reef biotopes have been assessed to a range of pressures by MarLIN (Tillin et al., 2020). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for Sabellaria spp. Reef biotopes shown in Annex 1 conclude: biotopes have a low to medium sensitivity to abrasion and medium sensitivity to penetration.

Please refer to the MarLIN website which provides further information about the assessment methodology and the supporting evidence (www.marlin.ac.uk/).

Depending on the footprint and the intensity of potting it is possible that the impacts from pots, weights or anchors making contact with subtidal Sabellaria spp. Reef could cause damage to the biogenic substrate (e.g. structurally breaking up the reef structure).</td></tr>
<tr><td>Assessment of impact pathway 2</td><td>2. Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities (Impacts on Biological Communities)</td></tr>
</table>

	No studies were found that directly or indirectly measured impacts of potting on the biological communities of *Sabellaria spp*. Reef. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Mobile species are less vulnerable to physical damage from potting compared to sessile epifauna (Gall *et al*., 2020). Echinoderms (*Asterias rubens* and *Pagurus bernhardus*) rolled or were gently moved away from the pot impact zone by the pressure wave preceding the moving pot (Gall *et al*., 2020). If potting were to occur across subtidal *Sabellaria spp*. Reef, 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 biological communities (JNCC & NE, 2011; Walmsley *et al*., 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 *et al*., 1996; Roberts *et al*., 2010; JNCC & NE, 2011, Gall *et al*., 2020). During spring tides, strong wind and large waves may cause unintentional movement of pots and any associated seabed abrasion could be increased (Eno *et al*., 2001; Sørensen *et al*., 2015; Stephenson *et al*., 2015). *Sabellaria spp*. Reef biotopes have been assessed to a range of pressures by MarLIN (Tillin *et al*., 2020). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for *Sabellaria spp*. Reef biotopes shown in Annex 1 conclude: biotopes have a low to medium sensitivity to abrasion and medium sensitivity to penetration. Please refer to the MarLIN website which provides further information about the assessment methodology and the supporting evidence (www.marlin.ac.uk/). Depending on the footprint and the intensity of potting it is possible that the impacts from pots, weights or anchors making contact with subtidal *Sabellaria spp.* Reef could cause damage to the subtidal biological communities.

6. SACs where the habitat occurs as a component of a designated feature

Dee Estuary SAC	The Dee Estuary SAC contains examples of the *Sabellaria spp.* Reef 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. The following features contain *Sabellaria spp.* Reef habitat within the Dee Estuary SAC:

	1. Estuaries
Cardigan Bay SAC	The Cardigan Bay SAC contains examples of the *Sabellaria spp.* Reef 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. The following features contain *Sabellaria spp.* Reef habitat within the Cardigan Bay SAC: 1. Reefs 2. Sandbanks
Lleyn Peninsula and the Sarnau SAC	The Lleyn Peninsula and the Sarnau SAC contains examples of the *Sabellaria spp.* Reef 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. The following features contain *Sabellaria spp.* Reef habitat within the Lleyn Peninsula and the Sarnau SAC: 1. Reefs 2. Large shallow inlets and bays 3. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge)
Severn Estuary SAC	The Severn Estuary SAC contains examples of the *Sabellaria spp.* Reef habitat, as evidenced by data and relevant literature (NRW, 2018d). Please see the latest SAC feature condition assessment for information on the location and condition of features. The following features contain *Sabellaria spp.* Reef habitat within the Severn Estuary SAC: 1. Estuaries 2. Reefs 3. Sandbanks 4. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge)

7. Evidence Gaps

- Direct studies to measure the impacts from potting on *Sabellaria spp*. Reef habitat.
- 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 4, representing low 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.	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.** **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.** **Score 1.**	**Based on similar fishing gears acting on the feature in other areas, or the fishing gear acting upon a similar feature in the UK.** **Score 1.**	Little agreement between evidence.

9. References

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Annex 1: Welsh biotopes included in the AWFA potting and Sabellaria spp Reef 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.

Sublittoral sediments	MarESA sensitivity to abrasion	MarESA sensitivity to penetration
LS.LBR.Sab.Salv	Low	Medium
SS.SBR.PoR.SalvMx	Low	Medium
CR.MCR.CSab.SSpi	Medium	Medium
CR.MCR.CSab.SSpi.As	Medium	Medium
CR.MCR.CSab.SSpi.ByB	Medium	Medium
SS.SBR.PoR.SspiMx	Medium	Medium