Pots, Traps and Creels Interactions with Subtidal Seacaves

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 site (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 and Creels Interactions with Subtidal Seacaves**	**Assessment of impact pathway 1: Physical damage to a designated habitat feature:** No studies were found that directly or indirectly measured or estimated physical impacts of potting on Subtidal Seacaves or similar habitats. It is unlikely that potting would intentionally take place within Subtidal Seacaves. Expert judgement suggests the physical impacts from pots, weights or anchors making contact with Subtidal Seacave habitat is unlikely to cause damage to the substrate. **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 measured or estimated the impacts of potting on the Subtidal Seacaves. It is unlikely that potting would intentionally take place within Subtidal Seacaves. Indirect evidence, expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots, weights or anchors making contact with Subtidal Seacaves habitat could cause damage to the biological communities. Confidence in this assessment is **low** (please see section 8).

3. Feature description

Feature Description: **Subtidal Seacaves**	Subtidal sea caves are Habitats Directive Annex I habitats which vary in size and are typically accompanied by the Annex 1 feature Reefs (JNCC, 2015). The development of sea caves is dependent on the geology of the rock and a variety of environmental conditions, including sand scour and wave surge. Changes in environmental conditions tend to occur along a gradient within a sea cave, which is reflected in the biological communities found there. A sea cave is typically marked with at least one entrance to a tunnel or cavern and contains vertical and overhanging rockfaces [CR.FCR.Cv] which may be covered by sponges, cup corals and anthozoans [CR.FCR.Cv.SpCup] as the main habitat for species but may also contain large overhangs and archways (Bunker and Holt, 2003). Biodiversity tends to be highest in sea caves which have large areas of vertical and overhanging rock (JNCC, 2004) and many of the species in the biotope (see Annex 1 for definition) are long-lived (Readman and Hiscock, 2018). As subtidal sea caves are completely submerged, they are subject to less water movement than intertidal sea caves, which allows for silt to accumulate on the seabed within the cave. In infralittoral parts of the sea cave, coralline crusts, barnacles and sponges may be found, in particular on severely scoured rock, typically in the biotopes [IR.FIR.SG.CC, IR.FIR.SG.CC.BalPom and IR.FIR.SG.CrSp] (Tillin, 2016). Smaller caves and those with mobile boulders also provide shelter for crustaceans, such as crabs, lobsters *Homarus gammarus*, and some fish species (e.g. leopard-spotted goby *Thorogobius ephippiatus*) [IR.FIR.SG.CC.Mo]. On the very exposed or wave surged vertical infralittoral rockface, species of anemones such as *Corynactis viridis* are found [IR.FIR.SG.CrSpAsAn] alongside crustose sponges and colonial ascidians. At cave entrances and overhanging rockfaces, alongside the crustose sponges and colonial ascidians, *Dendrodoa grossularia* and barnacles may be found [IR.FIR.SG.CrSpAsDenB]. In dense patches of *Dendrodoa grossularia*, some pockets of *Clathrina coriacea* may also be seen [IR.FIR.SG.DenCcor] on the infralittoral rock faces. At gully or cave entrances, foliose seaweeds may also be found alongside the coralline crusts [IR.FIR.SG.FoSwCC]. Fully subtidal sea caves are uncommon in Welsh waters, although it is likely that not all of them have been discovered. The majority of the known subtidal sea caves are in the Pembrokeshire Marine SAC (5 examples) with one subtidal sea cave also present in both the Pen Llyn and the Sarnau SAC and the Menai Strait and Conwy Bay SAC (see Bunker and Holt, 2003 for further detail).

4. Gear description

Gear Description: Pots, Traps and 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 and 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

Assessment of impact pathway 1	**1. Physical damage to a designated habitat feature (Physical Impacts):** No studies were found that directly or indirectly measured or estimated physical impacts of potting on Subtidal Seacaves or similar habitats. Walmsley *et al*. (2015) concluded that Subtidal Seacaves are unlikely to be significantly impacted by potting. It is unlikely that potting would intentionally take place within Subtidal Seacaves. If potting were to occur in Subtidal Seacaves, the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause minimal surface disturbance and abrasion (JNCC and 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 seabed (MacDonald *et al*., 1996; Roberts *et al*., 2010; JNCC and 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). Considering the stable and robust nature of rock, the physical impacts from pots, weights or anchors making contact with Subtidal Seacave habitat is unlikely to cause damage to the substrate.
Assessment of impact pathway 2	**2. Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities (Impacts on Biological Communities):** No studies were found that directly measured or estimated impacts of potting on the biological communities of Subtidal Seacaves. Assessments based on expert knowledge suggest vertical subtidal rock communities, which are similar to subtidal seacave communities, are highly sensitive to heavy and moderate levels of potting activity and of medium sensitivity to light levels of single fishing events if the epifauna come in to contact with the gear (Hall *et al*., 2008; Tillin *et al*., 2010; Walmsley *et al*., 2015). However, it is unlikely that potting would intentionally take place within Subtidal Seacaves. Indirect UK experimental potting studies on Bedrock Reef have reported potting to have minimal or no impacts on the biological communities, of subtidal rock habitats (bedrock, boulders and cobbles), including habitats with fragile organisms such as branching sponges, the bryozoan ross coral (*Pentapora foliacea*), the soft coral (*Alcyonium digitatum*) and pink sea fan (*Eunicella verrucosa*) (Eno *et al*., 2001; Hoskin, 2009; Coleman *et al*.,

	2013; Haynes *et al*., 2014; Vance and Ellis, 2016). However, several researchers acknowledge the risk of cumulative damage, especially to sensitive fragile species, from repeated impacts and higher intensities of potting (Hartnoll, 1998; Eno *et al*., 2001; Roberts *et al*., 2010; Coleman *et al*., 2013; Walmsley, *et al*., 2015; Rees, *et al.,* 2019, 2021). If potting were to occur in Subtidal Seacaves, the general physical impacts from static gear including pots, weights or anchors making contact with vertical subtidal rock during gear deployment could cause surface disturbance and abrasion to biological communities (JNCC and 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 vertical rock structures, potentially causing physical damage or abrasion to the biological communities (MacDonald *et al*., 1996; Roberts *et al*., 2010; JNCC and 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). If there is a sensitive species present further assessment of the potting activity is recommended (Walmsley *et al*., 2015). Subtidal Seacave biotopes have been assessed to a range of pressures by MarLIN (Tillin, 2020). Relevant pressures for the assessment of potting impacts is primarily abrasion of the rock. MarLIN abrasion sensitivity assessments for Subtidal seacave biotopes shown in Annex 1 conclude: the majority of biotopes have a low sensitivity to abrasion with two exhibiting high sensitivity [CR.FCR.Cv and CR.FCR.Cv.SpCup]. 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 Seacaves habitat could cause damage to the biological communities.

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

Menai Strait and Conwy Bay SAC	The Menai Strait and Conwy Bay SAC contains examples of the Subtidal Seacaves 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 Subtidal Seacaves habitat within the Menai Strait and Conwy Bay SAC: 1. Submerged or partially submerged sea caves 2. Reefs

	3. Large Shallow Inlets and Bays All of the known sea caves are named, for ease of reference. Please refer to Bunker *et al*. (2003) for further information.
Pembrokeshire Marine SAC	The Pembrokeshire Marine SAC contains examples of the Subtidal Seacaves 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 Subtidal Seacaves habitat within the Pembrokeshire Marine SAC: 1. Submerged or partially submerged sea caves 2. Reefs 3. Large Shallow Inlets and Bays 4. Mudflats and Sandflats Not Covered by Seawater at Low Tide (at the lower (seaward) edge) All of the known sea caves are named, for ease of reference. Please refer to Bunker *et al*. (2003) for further information.
Lleyn Peninsula and the Sarnau SAC	The Lleyn Peninsula and the Sarnau SAC contains examples of the Subtidal Seacaves 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 Subtidal Seacaves habitat within the Lleyn Peninsula and the Sarane SAC: 1. Submerged or partially submerged sea caves 2. Reefs 3. Estuaries 4. Large Shallow Inlets and Bays All of the known sea caves are named, for ease of reference. Please refer to Bunker *et al*. (2003) for further information.

7. Evidence Gaps

- None

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 5, 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.** **Score 2.**	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.	**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.

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 Subtidal Seacaves 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 assessments highlighted in the table below consider any type of potential abrasion and penetration 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**
CR.FCR.Cv [in description]	High	N/R
CR.FCR.Cv.SpCup [in description]	High	N/R
IR.FIR.SG.CC [in description]	Low	N/R
IR.FIR.SG.CC.BalPom [in description]	Low	N/R
IR.FIR.SG.CC.Mo [in description]	Low	N/R
IR.FIR.SG.CrSp [in description]	Low	N/R
IR.FIR.SG.CrSpAsAn [in description]	Low	N/R
IR.FIR.SG.CrSpAsDenB [in description]	Low	N/R
IR.FIR.SG.DenCcor [in description]	Low	N/R
IR.FIR.SG.FoSwCC [in description]	Low	N/R
LR.FLR.CvOv [included in intertidal sea caves]	Medium	N/R
LR.FLR.CvOv.AudCla [included in intertidal sea caves]	Low	Low
LR.FLR.CvOv.BarCv [included in intertidal sea caves]	Not sensitive	N/R
LR.FLR.CvOv.FaCr [included in intertidal sea caves]	Low	N/R
LR.FLR.CvOv.GCv [included in intertidal sea caves]	Low	Low
LR.FLR.CvOv.ScrFa [included in intertidal sea caves]	Low	N/R
LR.FLR.CvOv.SpByAs [included in intertidal sea caves]	Low	N/R
LR.FLR.CvOv.SpR [included in intertidal sea caves]	Low	N/R
LR.FLR.CvOv.SpR.Den [included in intertidal sea caves]	Low	N/R
LR.FLR.CvOv.VmucHil [included in intertidal sea caves]	Medium	N/R

N/R – not-relevant