Pots, Traps & Creels Interactions with Estuarine Rock

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** **Estuarine Rock**	**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 Estuarine Rock or similar habitats. Expert judgement suggests the impacts from pots, weights or anchors making contact with Estuarine Rock habitat is unlikely to cause physical 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 Estuarine Rock. Indirect evidence, expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots, weights or anchors making contact with Estuarine Rock habitat could cause damage to some of the biological communities. Confidence in this assessment is **low** (please see section 8).

3. Feature description

Feature Description: **Estuarine Rock**	Estuarine Rock habitats are uncommon in Wales as a whole and are most extensive in the Pembrokeshire Marine SAC. The substratum type covered by this feature includes boulder, cobble and bedrock which may be present from the supralittoral down to the subtidal circalittoral (Cooke, 2008; JNCC, 2015). This habitat excludes rocky habitats in areas of permanent full salinity. The biodiversity in the biotopes (see Annex 1 for definition) that comprise the Estuarine Rock feature is variable but provides a unique and critical area of connectivity between aquatic and terrestrial systems. A variety of seaweed species are present across a range of Estuarine Rock biotopes, with salinity and water movement or exposure leading to variation between communities. Typically, one seaweed species tends to dominate per biotope, with associated fauna being similar between all biotopes (Cooke, 2008). Within the context of the AWFA project, the Estuarine Rock feature is considered to be the same as the Section 7 BAP habitat of Estuarine Rocky Habitats. Note that many Estuarine Rock biotopes are also common to intertidal boulder and cobble reef environments, as well as intertidal sea caves, mussel beds on boulder and cobble skears, peat and clay exposures and *Sabellaria spp* reef environments, all of which are subject to separate consideration under the AWFA project. Sheltered Estuarine Rock is dominated by a range of fucoid communities ranging from *Ascophyllum nodosum* to *Fucus spp.* and associated fauna such as the tolerant species of crabs (e.g. *Carcinus maenas*), barnacles (e.g. *Semibalanus balanoides*) and winkles (e.g. *Littorina littorea*) [**LR.LLR.FVS.AscVS, LR.LLR.FVS.Fcer, LR.LLR.FVS.FserVS, LR.LLR.FVS.FspiVS, LR.LLR.FVS.FvesVS, LR.LLR.FVS.PelVS]** (Cooke, 2008; MarLIN, 2020). At the supralittoral fringe of an Estuarine Rock Community, bands of black, yellow and grey lichen may be visible on the rockface, requiring some degree of wave exposure [**LR.FLR.Lic.Ver.Ver** and **LR.FLR.Lic.YG**]. On the edge of the intertidal and more so in the subtidal, we have an abundant array of sessile epibiota, including anemones (e.g. *Diadumene sancta*), filter feeding sponges (e.g. *Halichondria panacea*), bryozoans (e.g. *Alcyonidium digitata*), hydroids (e.g. *Tubularia* spp.) and sea squirts (*Dendrodoa grossularia*) [e.g.**LR.FLR.CvOv.SpR.Den and CR.MCR.CFaVS.CuSpH**]. Estuarine environments are often subject to strong water movements and result in tideswept communities, promoting a range of other species which are tolerant to fast water movement [such as low salinity tolerant: **IR.MIR.KT.FilRVS** and the sponge dominated **CR.MCR.CFaVS.CuSpH**] (Cooke, 2008; EUNIS, 2019).

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

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 the impacts of potting on the Estuarine Rock or similar habitats. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Assessments based on expert knowledge suggest that potting is of limited concern to Estuarine Rock (Roberts *et al.*, 2010; Hall *et al.*, 2008; JNCC & NE, 2011). If potting were to occur across the Estuarine Rock, 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 & 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 & 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 impacts from pots, weights or anchors making contact with Subtidal Estuarine Rock habitat is unlikely to cause physical 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 Estuarine Rock habitat. As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Indirect UK experimental potting studies on subtidal rock habitats (bedrock, boulders and cobbles), conclude potting can impact the biological communities that include fragile organisms such as the soft coral dead man's fingers (*Alcyonium digitatum*) (Eno *et al*., 2001; Hoskin, 2009; Coleman *et al*., 2013; Haynes *et al*., 2014; Vance & Ellis, 2016; Rees *et al*., 2021). 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). Rees *et al*. (2019) assessed impacts to typical and common species and communities of Subtidal Bedrock Reef that were exposed to increasing intensities of potting during a three-year study in Lyme Bay and Torbay SAC.

	These were open sea communities, rather than estuarine, but some of the species may be present on Estuarine Rock, especially in the outer parts of estuaries. Total abundance of all sessile epifauna showed a decreasing trend over time in the medium and higher potting treatment areas. This contrasted with the control areas (where no potting occurred), which showed an increasing trend in total abundance of all sessile species over time (Rees *et al*., 2019). Rees *et al*. (2019; 2021) demonstrated higher and medium intensity potting levels significantly impacted two fragile epibenthic reef species in particular; the bryozoan 'ross coral' (*P. foliacea*) and a seasquirt (*Phallusia mammillata*). In the case of ross coral, only the complete cessation of potting (i.e. the non-fished control group) resulted in a recovery trend (Rees *et al*., 2019; 2021). In another Lyme Bay potting study, Gall *et al*. (2020) reported damage to almost a third (32%) of epifauna during the hauling of pots. The epifauna in Gall's (2020) study included several fragile typical species of Subtidal Bedrock Reef which may occur in the outer part of an estuary where Estuarine Rock may occur e.g. the bryozoan ross coral and the soft coral dead man's fingers. This suggests repeated potting could potentially affect local populations of these fragile species. If potting were to occur across Estuarine Rock, 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 biological communities (MacDonald, *et al*., 1996; Roberts *et al*., 2010; JNCC & NE, 2011). During spring tides, strong wind and large waves, unintentional movement of pots and any associated seabed abrasion could be increased (Eno *et al.,* 2001; Stephenson *et al*., 2015). If there is a sensitive species present further assessment of the potting activity is recommended (Walmsley *et al.*, 2015). Estuarine Rock biotopes have been assessed to a range of pressures by MarLIN (Tyler-Walters *et al.*, 2018). Relevant pressures for the assessment of potting impacts is primarily abrasion of the biological communities on rock surfaces. MarLIN abrasion sensitivity assessments for Estuarine Rock biotopes shown in Annex 1 conclude: a medium sensitivity to abrasion by most biotopes, with a small number of low and high sensitivities for intertidal biotopes where potting is unlikely to occur. 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 impacts from pots, weights or anchors making contact with Estuarine Rock habitat could cause damage to some of the biological communities.

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

Lleyn Peninsula and the Sarnau SAC	The Lleyn Peninsula and the Sarnau SAC contains examples of the Estuarine Rock 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 Estuarine Rock habitat within the Lleyn Peninsula and the Sarnau SAC: 1. Reefs 2. Estuaries
Carmarthen Bay and Estuaries SAC	The Carmarthen Bay and Estuaries SAC contains examples of the Estuarine Rock 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 Estuarine Rock habitat within the Carmarthen Bay and Estuaries SAC: 1. Estuaries
Pembrokeshire Marine SAC	The Pembrokeshire Marine SAC contains examples of the Estuarine Rock 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 Estuarine Rock habitat within the Pembrokeshire Marine SAC: 1. Large Shallow Inlets and Bays 2. Estuaries 3. Reefs
Severn Estuary SAC	The Severn Estuary SAC contains examples of the Estuarine Rock 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 Estuarine rock habitat within the Severn Estuary SAC: 1. Estuaries

7. Evidence Gaps

- Direct studies to measure the impacts from potting on Estuarine Rock 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 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.

9. References

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Annex 1: Welsh biotopes included in the AWFA potting and Estuarine Rock (Boulder, Cobble and Bedrock)

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.

Component Biotopes	MarESA sensitivity to abrasion	MarESA sensitivity to penetration
LR.LLR.FVS.AscVS	High	Not relevant
LR.LLR.FVS.Fcer	Medium	Medium
LR.LLR.FVS.FserVS	Medium	Not relevant
LR.LLR.FVS.FspiVS	Medium	Not relevant
LR.LLR.FVS.FvesVS	Medium	Medium
LR.LLR.FVS.PelVS	Medium	Not relevant
LR.FLR.Lic.YG	High	Not relevant
LR.FLR.Lic.Ver	Medium	Not relevant
LR.FLR.Eph.Ent	Low	Not relevant
LR.FLR.Eph.EntPor	Low	Not relevant
CR.MCR.CFaVS.CuSpH	Medium	Not relevant
CR.MCR.CFaVS.CuSpH.As	Medium	Not relevant
CR.MCR.CFaVS.CuSpH.VS	Medium	Not relevant
IR.MIR.KT.FilRVS	Low	Not relevant
SS.SMp.KSwSS.LsacGraFS	Medium	Medium
SS.SMx.SMxVS.CreMed	Low	Low
LR.FLR.CvOv.SpR.Den	Low	Not relevant