Pots, Traps & Creels Interactions with Kelp Forest Communities

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 Kelp Forest Communities**	**Assessment of impact pathway 1: Physical damage to a designated habitat feature:** As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Direct evidence (of low confidence), expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots, weights or anchors making contact with subtidal parts of the Kelp Forest Community habitat could cause physical damage to the biogenic feature (e.g. remove fronds, overturn cobbles or small boulders). **Assessment of impact pathway 2: Damage to a designated habitat feature via removal of, or other detrimental impact to, associated biological communities:** As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. Direct evidence (of low confidence), expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots weights or anchors making contact with the subtidal parts of the Kelp Forest Community habitat could cause damage to the subtidal biological communities. Confidence in this assessment is **low** (please see section 8).

3. Feature description

Feature Description: Kelp Forest Communities	Kelp Forest Communities are found from the infralittoral zone into depths of approximately 20 - 30m, depending on the depth light can penetrate. Kelp communities are found in a wide variety of exposures, as long as there is suitable ground for attachment, including rock, boulder and cobble. They are common in Welsh waters, found in almost any area of shallow water with rocky ground; the only exception being extremely turbid environments like the Severn Estuary. The term 'forest' typically refers to kelp communities that form dense stands, usually in shallow water and with higher light intensities while 'park' refers to kelp scattered more widely and occurs at greater depths where less light to reaches the seabed (Fuller,1999). The AWFA feature description includes both types of kelp community. Annex 1 lists Welsh biotopes associated with this feature and the definition of 'biotope'. In exposed situations, *Alaria esculenta* biotopes are typical in the sublittoral fringe. IR.HIR.KFaR.Ala.Ldig (with *Laminaria digitata*) predominates in more sheltered conditions, whereas IR.HIR.KFaR.Ala.Myt is common on exposed rock faces and characterised by patches of mussels. *Laminaria hyperborea* is the typical kelp 'forest' forming species in Wales and can often be found in high densities with a characteristic understory of red algae. On exposed shores, *L. hyperborea* is represented by biotopes IR.HIR.KFaR.LhypR.Ft and IR.HIR.KFaR.LhypR.Pk (two most common kelp biotopes in Wales), along with the diverse wave exposed biotope IR.HIR.KFaR.LhypFa, and on exposed vertical rock, IR.HIR.KFaR.LhypRVt (JNCC, 2015). Kelp communities are also found on high energy infralittoral rock subject to abrasion by course sediment and sand. These communities are characterised by more the more ephemeral species *Saccharina latissima* (formally *L. saccharina*), *Saccorhiza polyschides*, *Halidrys siliquosa* and *Chorda filum* in biotopes IR.HIR.KSed.Sac, IR.HIR.KSed.LsacChoR and IR.HIR.KSed.LsacSac (JNCC, 2015). On moderately exposed shores, *L. digitata* is a common kelp species, forming a narrow band in the sublittoral fringe and is often less extensive and in shallower water than *L. hyperborea.* It is widely distributed in Wales and is found on boulders (IR.MIR.KR.Ldig.Bo), in a dense canopy with a wide range of red seaweeds (IR.MIR.KR.Ldig.Ldig) and on soft rock with piddocks (IR.MIR.KR.Ldig.Pid). *L hyperborea* is also a significant kelp species in moderately exposed shores, often dense and accompanied by an understory of foliose red seaweeds and coralline crust commonly occurring in the biotopes IR.MIR.KR.Lhyp.Ft and IR.MIR.KR.Lhyp.Pk (JNCC, 2015). Kelp communities are also found in areas of high tidal stream with little wave action (see the Tide-Swept Communities feature for further detail). In low energy environments, *S. latissima* can form dense canopies in the sublittoral fringe, usually with a low species diversity, in the biotopes IR.LIR.K.Lsac.Pk and IR.LIR.K.Lsac.Pk. *S. latissima* can also be found in

	mixed canopies with *L, hyperborea* (IR.LIR.K.LhypLsac.Pk and IR.LIR.K.LhypLsac) and *L. digitata* (IR.LIR.K.Lsac.Ldig) and are relatively uncommon biotopes in Wales. A number of kelp communities are found on sublittoral sediment, where the sheltered habitat enables them to grow on shells and stones on the sediment surface. Several biotopes exist, the most common in Wales being SS.SMp.KSwSS.LsacR.CbPb (red seaweeds/kelps on tide-swept mobile infralittoral cobbles and pebbles).

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):** As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. A study on the impact of potting directly observed a higher incidence of kelp (*Saccharina latissima*) within a fished site, compared to a control area that was not fished (Young, 2013; Walmsley *et al*., 2015). The outcomes of this study are of low confidence, as it was undertaken at a small local site with adverse weather conditions reported during the study. This meant it was not possible to establish with certainty the cause of the differences in kelp occurrence (Walmsley *et al*., 2015). Assessments based on expert knowledge suggest that Kelp Forest Communities are of low sensitivity to potting (Hall *et al*., 2008; Tillin *at al*., 2010; Roberts *et al*., 2010). However, researchers acknowledge the risk of cumulative damage, especially to sensitive fragile species, from repeated impacts and higher intensities of potting (Roberts *et al*., 2010; Walmsley *et al*., 2015). If potting were to occur across Kelp Forest Communities, 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 & 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 and to kelp plants (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 Kelp Forest Communities habitat is comprised of the plants that create the structure. Kelp Forest Communities biotopes have been assessed to a range of pressures by MarLIN (Jasper and Hill, 2015). Relevant pressures for the assessment of potting impacts are primarily abrasion, with

	penetration of mixed and stony sediments possible. MarLIN abrasion and penetration sensitivity assessments for kelp communities shown in Annex 1 conclude: low to medium sensitivity to abrasion and medium or high sensitivity to penetration for just two biotopes. 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 the impacts from pots, weights or anchors making contact with the subtidal parts of the Kelp Forest Communities habitat could cause physical damage to the biogenic feature (e.g. remove fronds, overturn cobbles or small boulders).
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):** As potting is a subtidal activity it is unlikely to interact with intertidal parts of this habitat. A study on the impact of potting directly observed a higher incidence of kelp (*Saccharina latissima*) within a fished site, compared to a control area that was not fished (Young, 2013; Walmsley *et al*., 2015). The outcomes of this study are of low confidence, as it was undertaken at a small local site with adverse weather conditions reported during the study. This meant it was not possible to establish with certainty the cause of the differences in kelp occurrence (Walmsley *et al*., 2015). Assessments based on expert knowledge suggests that Kelp Forest Communities are of low sensitivity to potting (Hall *et al*., 2008; Tillin *at al*., 2010; Roberts *et al*., 2010). However, researchers acknowledge the risk of cumulative damage, especially to sensitive fragile species, from repeated impacts and higher intensities of potting (Roberts *et al*., 2010; Walmsley *et al*., 2015). Mobile species are less vulnerable to physical damage from potting compared to sessile epifauna (Gall *et al*., 2020). Echinoderms and crustaceans (*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 Kelp Forest Communities, 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). Kelp Forest Communities biotopes have been assessed to a range of pressures by MarLIN (Jasper and Hill, 2015). Relevant pressures for the assessment of potting impacts are primarily abrasion, with penetration of mixed and stony sediments possible. MarLIN abrasion and penetration sensitivity assessments for Kelp Forest Communities shown in Annex 1 conclude: low to medium sensitivity to abrasion and medium or high sensitivity to penetration for just two biotopes. 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 the impacts from pots, weights or anchors making contact with the subtidal parts of the Kelp Forest Community habitat could cause damage to the subtidal 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 Kelp Forest Communities 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 Kelp Forest Communities habitat within the Lleyn Peninsula and the Sarnau SAC: 1. Reefs 2. Large Shallow Inlets and Bays
Menai Strait and Conwy Bay SAC	The Menai Strait and Conwy Bay SAC contains examples of the Kelp Forest Communities 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 Kelp Forest Communities habitat within the Menai Strait and Conwy Bay SAC: 1. Large Shallow Inlets and Bays 2. Reefs

Carmarthen Bay and Estuaries SAC	The Carmarthen Bay and Estuaries SAC contains examples of the Kelp Forest Communities 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 Kelp Forest Communities habitat within the Carmarthen Bay and Estuaries SAC: 1. Large Shallow Inlets and Bays
Pembrokeshire Marine SAC	The Pembrokeshire Marine SAC contains examples of the Kelp Forest Communities 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 Kelp Forest Communities habitat within the Pembrokeshire Marine SAC: 1. Large Shallow Inlets and Bays 2. Reefs 3. Estuaries 4. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge)
Cardigan Bay SAC	The Cardigan Bay SAC contains examples of the Kelp Forest Communities habitat, as evidenced by data and relevant literature (NRW, 2018e). Please see the latest SAC feature condition assessment for information on the location and condition of features. The following features contain Kelp Forest Communities habitat within the Cardigan Bay SAC: 1. Reefs

7. Evidence Gaps

- Direct studies to measure the impacts from potting on Kelp Forest Communities 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.

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Annex 1: Welsh biotopes included in the AWFA potting and Kelp Forest Communities 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.

Biotope Components	MarESA sensitivity to abrasion	MarESA sensitivity to penetration
IR.HIR.KFaR.Ala	Low	Not relevant (NR)
IR.HIR.KFaR.Ala.Ldig	Low	Not relevant (NR)
IR.HIR.KFaR.Ala.Myt	Low	Not relevant (NR)
IR.HIR.KFaR.LhypFa	Medium	Not relevant (NR)
IR.HIR.KFaR.LhypR	Medium	Not relevant (NR)
IR.HIR.KFaR.LhypR.Ft	Medium	Not relevant (NR)
IR.HIR.KFaR.LhypR.Pk	Medium	Not relevant (NR)
IR.HIR.KFaR.LhypRVt	Medium	Not relevant (NR)
IR.HIR.KSed.LsacChoR	Medium	Not relevant (NR)
IR.HIR.KSed.LsacSac	Medium	Not relevant (NR)
IR.HIR.KSed.Sac	Medium	Not relevant (NR)
IR.MIR.KR.Ldig	Low	Not relevant (NR)
IR.MIR.KR.Ldig.Bo	Medium	Medium
IR.MIR.KR.Ldig.Ldig	Low	Not relevant (NR)
IR.MIR.KR.Ldig.Pid	Medium	High
IR.MIR.KR.Lhyp	Medium	Not relevant (NR)
IR.MIR.KR.Lhyp.Ft	Medium	Not relevant (NR)
IR.MIR.KR.Lhyp.GzFt	Medium	Not relevant (NR)
IR.MIR.KR.Lhyp.GzPk	Medium	Not relevant (NR)
IR.MIR.KR.Lhyp.Pk	Medium	Not relevant (NR)

IR.LIR.K.LhypLsac	Medium	Not relevant (NR)
IR.LIR.K.LhypLsac.Pk	Medium	Not relevant (NR)
IR.LIR.K.Lsac	Low	Not relevant (NR)
IR.LIR.K.Lsac.Ft	Low	Not relevant (NR)
IR.LIR.K.Lsac.Ldig	Low	Not relevant (NR)
IR.LIR.K.Lsac.Pk	Low	Not relevant (NR)
SS.SMp.KSwSS.LsacCho	Medium	Medium
SS.SMp.KSwSS.LsacGraFS	Medium	Medium
SS.SMp.KSwSS.LsacGraVS	Medium	Medium
SS.SMp.KSwSS.LsacR	Medium	Medium
SS.SMp.KSwSS.LsacR.CbPb	Medium	Medium
SS.SMp.KSwSS.LsacR.Gv	Medium	Medium
SS.SMp.KSwSS.LsacR.Sa	Medium	Medium