Pots, Traps & Creels Interactions with Subtidal Muddy Sand

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 Subtidal Muddy Sand	**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 Muddy Sand or similar habitats. Expert judgement suggests the physical impacts from pots, weights or anchors making contact with Subtidal Muddy Sand habitat could 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:** Direct evidence, expert judgement and indicative MarLIN sensitivity assessments suggest the impacts from pots, weights or anchors making contact with subtidal Subtidal Muddy Sand habitat could cause damage to some of the biological communities. Confidence in this assessment is **medium** (please see section 8).

3. Feature description

Feature Description: **Subtidal Muddy Sand**	Subtidal Muddy Sand is found from shallow areas, below the extreme low water mark (infralittoral), to deep offshore circalittoral habitats, e.g. the Celtic Deep. The habitat consists of non-cohesive muddy sand with the silt / clay content typically ranging from 5% - 20% and are often subject to a degree of wave action or currents which restricts the clay content (JNCC, 2015). Annex 1 lists Welsh biotopes associated with this feature and provides the definition of 'biotope'. Both the infralittoral and circalittoral habitat components typically support a variety of animal dominated communities, particularly polychaetes, bivalves and echinoderms. Infralittoral muddy sand communities typically contain polychaete species (*Magelona mirabilis, Arenicola marina, Nephtys hombergii),* bivalve species (*Fabulina fabula, Spisula subtruncata, Ensis* spp) and the echinoderm *Echinocardium cordatum* in the following principal biotopes common in Wales, SS.SSa.IMuSa.FfabMag and SS.SSa.IMuSa.EcorEns (JNCC, 2015, MarLIN, 2020). The circalittoral components, generally found in water depths over 15-20m, typically support a richer infaunal community as the habitats tend to be more stable. Some areas may contain slightly shelly / gravelly areas of muddy sand (JNCC, 2015). Animal-dominated communities are characterised by a wide variety of polychaetes (e.g. *Nephtys* spp., *Chaetozone setosa* and *Spiophanes bombyx)* and bivalves (*Abra alba, Nucula nitidosa and Fabulina fabula*). These species are generally associated with the circalittoral muddy sand biotope SS.SSa.CMuSa.AalbNuc. Note that this community cycles with and /or transitions to the biotope SS.SMu.CSaMu.LkorPpel in muddier sediments (e.g. Red Wharf Bay), which is covered under Subtidal Mud. Deep muddy sand communities in the Celtic Deep were sampled during the HABMAP project (Robinson *et al.*, 2009), where the bivalves *Abra nitida, Corbula gibba* and *Parvicardium sp.,* polychaetes *Mediomastus fragilis, Galathowenia sp., Diplocirrus glaucus, Scalibregma inflatum,* and gastropod *Alvania abyssicola* were recorded as the most prevalent species. In shallow non-cohesive muddy sands, abundant populations of echinoderms can occur, such as *Amphiura* spp., *Ophiura* spp., *Astropecten irregularis, Asterias rubens* and *Echinocardium cordatum*, are commonly associated with the circalittoral muddy sand biotope SS.SSa.CMuSa.AbraAirr (JNCC, 2015), recorded in Wales in Conwy Bay, Red Wharf Bay and Tremadog Bay (data from the Marine Recorder database, September 2020). Many of the species in Subtidal Muddy Sands are opportunistic, with short life spans and high production rates, therefore, the fauna of this habitat is liable to be quite variable from year to year (NRW, 2018a, b, c).

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 physical impacts of potting on Subtidal Muddy Sand or similar habitats. Assessments based on expert knowledge suggest that potting is of limited concern to Subtidal Muddy Sand (Roberts *et al.*, 2010; Hall *et al.*, 2008; JNCC and NE, 2011). If potting were to occur across Subtidal Muddy Sand, the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during gear deployment could cause surface disturbance (e.g. scour marks) in the sediment (JNCC & NE, 2011; Walmsley *et al.*, 2015; Gall *et al*., 2020). However, it seems unlikely that impacts from potting would prevent feature recovery in the long term. 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). Depending on the footprint and the intensity of potting it is possible that the physical impacts from pots, weights or anchors making contact with Subtidal Muddy Sand habitat could 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)** A direct study suggests that 50% of Sea Whips (*Halipteris willemoesi*) within muddy sand were damaged by entanglement with potting gear. (Troffe *et al.*, 2005). While Sea Whips are not found in Welsh Waters, similar sensitive and erect epifauna such as the pink sea fan (*Eunicella verrucosa*) are found in Muddy Sand habitats within the Pembrokeshire Marine SAC. Due to the small and local scale of the study, confidence in applying the conclusions to Welsh waters are reduced. If potting were to occur across Subtidal Muddy Sand, 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 (Roberts *et al.*, 2010; JNCC & NE, 2011; Walmsley *et al.*, 2015; Gall *et al*., 2020). 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). If there is a sensitive species present further assessment of the potting activity is recommended (Walmsley *et al.*, 2015). Subtidal Muddy Sand biotopes have been assessed to a range of pressures by MarLIN (Tillin and Rayment, 2016). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for Subtidal Muddy Sand biotopes shown in Annex 1 conclude: 3 biotopes have a medium sensitivity to abrasion and penetration with 2 biotopes exhibiting low sensitivity. 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 Muddy Sand habitat could cause damage to some of the 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 Subtidal Muddy Sand 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 Subtidal Muddy Sand habitat within the Dee Estuary SAC: 1. Estuaries
Menai Strait and Conwy Bay SAC	The Menai Strait and Conwy Bay SAC contains examples of the Subtidal Muddy Sand 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 Muddy Sand habitat within the Menai Strait and Conwy Bay SAC: 1. Large Shallow Inlets and Bays 2. Sandbanks which are slightly covered by seawater all the time

Cardigan Bay SAC	The Cardigan Bay SAC contains examples of the Subtidal Muddy Sand 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 Subtidal Muddy Sand habitat within the Cardigan Bay SAC: 1. Sandbanks which are slightly covered by sea water all the time
Carmarthen Bay and Estuaries SAC	The Carmarthen Bay and Estuaries SAC contains examples of the Subtidal Muddy Sand 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 Muddy Sand 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 Subtidal Muddy Sand habitat, as evidenced by data and relevant literature (NRW, 2018f). Please see the latest SAC feature condition assessment for information on the location and condition of features. The following features contain Subtidal Muddy Sand habitat within the Pembrokeshire Marine SAC: 1. Estuaries 2. Large Shallow Inlets and Bays 3. Sandbanks which are slightly covered by seawater all the time
Lleyn Peninsula and the Sarnau SAC	The Lleyn Peninsula and the Sarnau SAC contains examples of the Subtidal Muddy Sand 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 Muddy Sand habitat within the Lleyn Peninsula and the Sarnau SAC: 1. Large Shallow Inlets and Bays 2. Sandbanks which are slightly covered by seawater all the time

7. Evidence Gaps

- Direct studies to measure the impacts from potting on Subtidal Muddy Sand 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 7, representing medium 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.** **Score 3.**	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.	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 Muddy Sand 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
SS.SSa.CMuSa.AalbNuc	Low	Low
SS.SSa.CMuSa.AbraAirr	Medium	Medium
SS.SMu.CSaMu.LkorPpel	Medium	Medium
SS.SSa.IMuSa.EcorEns	Medium	Medium
SS.SSa.IMuSa.FfabMag	Low	Low