Pots, Traps & Creels Interactions with Subtidal Sand (High Energy)

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 Sand (High Energy)**	**Assessment of impact pathway 1: Physical damage to a designated habitat feature:** Indirect evidence and expert judgement suggests the physical impacts from pots, weights or anchors making contact with Subtidal Sand (High Energy) 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 Sand (High Energy) habitat could cause damage to the biological communities. Confidence in this assessment is **medium** (please see section 8).

3. Feature description

Feature Description: Subtidal Sand (High Energy)	Subtidal Sand (High Energy) occurs in a wide range of open coast and estuarine environments and includes a range of sand sediment types, from fine to coarse (Robinson *et al*., 2009). The arrangement and texture of the sediment depends on the exposure to water movement. As this feature is focused on high energy habitats, the resultant fauna and flora will be robust and the topography variable and site-specific (BRIG, 2011). Annex 1 lists the main biotopes associated with Subtidal Sand (High Energy) feature in Wales and includes the 'biotope' definition. These biotopes are common across Wales, in particular on sandbanks and exposed areas of the more western Welsh SACs and most estuaries (JNCC, 2015). Medium to fine sandy sediment is found in shallow water or at exposed tide-swept coasts and will contain very few infauna due to the mobility of the sand (BRIG, 2011). A small number of opportunistic species may be found within areas of less mobile sediment, such as amphipods, mysids (e.g. *Gastrosaccus spinifer*), polychaetes (e.g. *Nephtys cirrosa*) and isopods (e.g. *Eurydice pulchra*) [SS.SSa.IFiSa.IMoSa]. Larger species associated with this biotope also include a few crustacean species (such as *Pagurus bernhardus*, *Liocarcinus depurator and Carcinus maenas*) and the echinoderm *Asterias rubens* with sand eels (*Ammodytes spp.*) occasionally found buried in the sands (JNCC, 2015). In areas where medium and fine sands are well-sorted and less exposed to tidal influence, a biotope characterized by *Nephtys cirrosa* and *Bathyporeia spp*. (and occasionally *Pontocrates spp*.) may occur [SS.SSa.IFiSa.NcirBat]. There is still sediment disturbance occurring in this biotope, but mainly occurs from wave action, as this habitat occurs mainly in shallow waters (MarLIN, 2020). In sheltered areas, the polychaete *Magelona mirabilis* is frequently found and in coarser sediment the polychaete *Chaetozone setosa* replaces *M. mirabilis*. Actively swimming amphipods are associated with this biotope, rather than sediment dwelling amphipods, and small bristleworms, such as *Spio filicornis* and *Spio martinensis* (JNCC, 2015). Some areas of Subtidal Sand (High Energy) also contain cobbles and pebbles, which are exposed to strong tidal streams. These larger grain sizes make it easier for hydroids to colonise, such as *Hydrallmania falcata*, *Sertularia cupressina* and *Sertularia argentea*, which are tolerant to intermittent submergence [SS.SSa.IFiSa.ScupHyd]. The larger, more stable cobbles give opportunity for species such as *Flustra foliacea*, *Balanus crenatus* and *Alcyonidium diaphanum* to settle. Whilst the anemone, *Urticina felina* and sand mason worm, *Lanice conchilega* may be found at the sediment surface (BRIG, 2011). Very mobile sand sediment can be found at the interface of sea and estuary where a strong salinity gradient and tidal flows are experienced within channels, leading to the suspension of mud and silt. The biotope is unstable and environment abrasive. A low number of tolerant species are found here such as the arthropods, *Eurydice*

	pulchra or *Mesopodopsis slabberi* [SS.SSa.SSaVS.MoSaVS]. Some polychaetes may also be present, including *Capitella capitata*, *Eteone spp.* and *Arenicola marina*. Areas of less mobile sand but variable salinity gradients still give rise to unstable and shifting habitats. These fluctuating habitats provide a suitable environment for the polychaetes *Nephtys cirrosa* and *Scoloplos armiger*, and amphipods of the genus *Bathyporeia* and *Haustorius arenarius*. When the sediment is the most stable, bivalves occur which are tolerant of the variable salinity, such as *Limecola balthica* and *Macoma balthica* and only found in the Severn Estuary and Dee Estuary SACs [SS.SSa.SSaVS.NcirMac].

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 15-20 kg 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 measured or estimated physical impacts of potting on Subtidal Sand (High Energy). Multiple sources of indirect evidence suggests that dynamic sand habitats are thought to recover quickly after disturbance, whether disturbance is human-induced or not (Collie *et al*., 2000; Hinz *et al*., 2010; Sciberras *et al*., 2013). An increase in the intensity of disturbance to sand habitats will increase the recovery time of the habitat (Dernie *et al*., 2003). Assessments based on expert knowledge suggest that potting is of limited concern to Subtidal Sand (High Energy) sediments (Roberts *et al.*, 2010; Hall *et al.*, 2008; JNCC and NE, 2011). Sand sediments are considered to have low sensitivity to surface abrasion caused by potting activities (Hall *et al.*, 2008). If potting were to occur across Subtidal Sand (High Energy), the general physical impacts from static gear, including pots, weights or anchors, making contact with the seabed during deployment could cause surface disturbance (e.g. scour marks) and abrasion (JNCC and 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 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).

	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 Sand (High Energy) 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 small-scale study concluded there is very little evidence of change to the biotopes of sand habitats where potting occurs, however, the species composition and/or richness may change over time (Stephenson *et al*., 2015). Multiple sources of indirect evidence suggests that dynamic sand habitats are thought to recover quickly after disturbance, whether disturbance is human-induced or not (Collie *et al*., 2000; Hinz *et al*., 2010; Sciberras *et al*., 2013). An increase in the intensity of disturbance to sand habitats will increase the recovery time of the habitat (Dernie *et al*., 2003). If potting were to occur across Subtidal Sand (High Energy), 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 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, further assessment of the intensity of potting activity is recommended (Walmsley *et al.*, 2015). Subtidal Sand (High Energy) biotopes have been assessed to a range of pressures by MarLIN (Tillin and Garrard, 2019). Relevant pressures for the assessment of potting impacts are primarily abrasion and penetration of the sediment. MarLIN abrasion and penetration sensitivity assessments for Subtidal Sand (High Energy) biotopes shown in Annex 1 conclude: all biotopes have a low sensitivity to both abrasion and 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 Sand (High Energy) habitat could cause damage to 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 Sand (High Energy) 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 Sand (High Energy) habitat within the Dee Estuary SAC: 1. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge) 2. Estuaries
Menai Strait and Conwy Bay SAC	The Menai Strait and Conwy Bay SAC contains examples of the Subtidal Sand (High Energy) 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 Sand (High Energy) habitat within the Menai Strait and Conwy Bay SAC: 1. Large Shallow Inlets and Bays 2. Sandbanks which are slightly covered by seawater at low tide
Carmarthen Bay and Estuaries SAC	The Carmarthen Bay and Estuaries SAC contains examples of the Subtidal Sand (High Energy) 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 Sand (High Energy) habitat within the Carmarthen Bay and Estuaries SAC: 1. Large shallow inlets and bays 2. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge) 3. Estuaries 4. Sandbanks which are slightly covered by sea water all the time

Pembrokeshire Marine SAC	The Pembrokeshire Marine SAC contains examples of the Subtidal Sand (High Energy) 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 Sand (High Energy) habitat within the Pembrokeshire Marine SAC: 1. Estuaries 2. Large shallow inlets and bays 3. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge) 4. Sandbanks which are slightly covered by seawater at low tide
Lleyn Peninsula and the Sarnau SAC	The Lleyn Peninsula and the Sarnau SAC contains examples of the Subtidal Sand (High Energy) 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 Sand (High Energy) 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
Severn Estuary SAC	The Severn Estuary SAC contains examples of the Subtidal Sand (High Energy) 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 Sand (High Energy) habitat within the Severn Estuary SAC: 1. Sandbanks which are slightly covered by sea water all the time 2. Mudflats and sandflats not covered by seawater at low tide (at the lower (seaward) edge) 3. Estuaries

7. Evidence Gaps

- Direct studies to measure the impacts from potting on Subtidal Sand (High Energy) 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 6, 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. Score 3.**	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.	**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

BRIG (2011). UK Biodiversity Action; Plan Priority Habitat Descriptions. Subtidal sands and gravels. JNCC. Updated 2011. Viewed 14.09.2020. https://data.jncc.gov.uk/data/2728792c-c8c6-4b8c-9ccd-a908cb0f1432/UKBAP-PriorityHabitatDescriptions-Rev-2011.pdf.

Channel Pots. (2020). Suppliers of whelk pots since 2015. [Accessed 10th August 2020]. https://www.channelpots.co.uk.

Coastal nets. (2020). Crab, Lobster, Crayfish, Cuttlefish, Whelk Pots & Potting Components. [Accessed 10th August 2020]. https://www.coastalnets.co.uk.

Collie, J. S., Hall, S. J., Kaiser, M. J., & Poiner, I. R. (2000). A quantitative analysis of fishing impacts on shelf-sea benthos. *Journal of animal ecology*, *69*(5), 785-798.

Cornwall Creels. (2020). Plastic coated pot frames. [Accessed 28th July 2020]. https://www.cornwallcreels.co.uk.

Dernie, K. M., Kaiser, M. J., Richardson, E. A., & Warwick, R. M. (2003). Recovery of soft sediment communities and habitats following physical disturbance. *Journal of Experimental Marine Biology and Ecology*, *285*, 415-434.

Eno, N.C., MacDonald, D.S., Kinnear, J.A.M., Amos, C.S., Chapman, C.J., Clark, R.A., Bunker, F. StP.D. & Munro, C. (2001). Effects of crustacean traps on benthic fauna. ICES Journal of Marine Science, 58: 11–20.

FAO. (2001). Fishing Gear types. Pots. Technology Fact Sheets. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 13 September 2001. [Accessed 04th February 2020]. www.fao.org/fishery/geartype/225/en.

Gall, S. C., Rodwell, L. D., Clark, S., Robbins, T., Attrill, M. J., Holmes, L. A., & Sheehan, E. V. (2020). The impact of potting for crustaceans on temperate rocky reef habitats: Implications for management. Marine Environmental Research, 105134.

Gravestock, V. (2018). The Needles MCZ – Part B Fisheries Assessment – Potting.

Hall, K., Paramor, O.A.L., Robinson L.A., Winrow-Giffin, A., Frid C.L.J., Eno, N.C., Dernie, K.M., Sharp, R.A.M., Wyn, G.C.& Ramsay, K. (2008). Mapping the sensitivity of benthic habitats to fishing in Welsh waters- development of a protocol. CCW [Policy Research] Report No: [8/12], 85pp.

Hinz, H., Scriberras, M., Murray, L. G., Benell, J. D., & Kaiser, M. J. (2010). Assessment of offshore habitats in the Cardigan Bay SAC (June 2010 survey). *Fisheries & Conservation report*, (14), 30.

JNCC & Natural England. (2011). Advice from the Joint Nature Conservation Committee and Natural England with regards to fisheries impacts on Marine Conservation Zone habitat features. 113 pp.

JNCC. (2015). The Marine Habitat Classification for Britain and Ireland Version 15.03. [Accessed 02/06/2020]. Available from: https://mhc.jncc.gov.uk.

MacDonald, D.S., Little, M., Eno, N.C. & Hiscock, K. (1996). Disturbance of benthic species by fishing activities: a sensitivity index. Aquatic Conservation: Marine and Freshwater Ecosystems, 6(4), 257-268.

NRW. (2018a). Dee Estuary / Aber Dyfrdwy Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 229, 35pp, NRW, Bangor.

NRW. (2018b). Y Fenai a Bae Conwy / Menai Strait and Conwy Bay Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 232, 33pp, NRW, Bangor.

NRW. (2018c). Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 225, 49pp, NRW, Bangor.

NRW. (2018d). Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 233, 67pp, NRW, Bangor.

NRW. (2018e). Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau Special Area of Conservation Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017. Natural Resources Wales, Bangor pp 143.

NRW. (2018f). Severn Estuary / Môr Hafren Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 235, 41pp, NRW, Bangor.

Pantin, J.R., Murray, L.G., Cambiè, G., Le Vay, L. & Kaiser, M.J. (2015). Escape Gap Study in Cardigan Bay: consequences of using lobster escape gaps. A Preliminary Report. Fisheries & Conservation report No. 44, Bangor University. 43 pp.

Roberts, C., Smith, C., Tillin, H. Tyler-Walters, H. (2010). Review of existing approaches to evaluate marine habitat vulnerability to commercial fishing activities. November 2010.

Robinson, K. A., Darbyshire, T., Van Landeghem, K., Lindenbaum, C., McBreen, F., Creaven, S., Ramsay, K., Mackie, A. S. Y., Mitchell, N. C., Wheeler, A., Wilson, J. G. O'Beirn, F. 2009. Habitat mapping for conservation and management of the southern Irish Sea (HABMAP). I: Seabed surveys. Studies in Marine Biodiversity and Systematics from the National Museum of Wales. BIOMÔR Reports 5(1): 234 pp.

Sciberras, M., Hinz, H., Bennell, J. D., Jenkins, S. R., Hawkins, S. J., & Kaiser, M. J. (2013). Benthic community response to a scallop dredging closure within a dynamic seabed habitat. *Marine Ecology Progress Series*, *480*, 83-98.

Seafish. (2020a). Fishing Gear Database: Pots and traps - general. [Accessed 04th February 2020]. https://seafish.org/gear-database/gear/pots-and-traps/.

Seafish. (2020b). Fishing Gear Database: Pots and traps - lobster. [Accessed 24th February 2020]. https://seafish.org/gear-database/gear/pots-and-traps-lobster/.

Seafish. (2020c). Fishing Gear Database: Pots and trap – nephrops. [Accessed 24th February 2020]. https://seafish.org/gear-database/gear/pots-and-trap-nephrops/.

Sørensen, T.K., Larsen, F. & Bridda, J. (2015). Impacts of bottom-set gillnet anchors on the seafloor and associated flora – potential implications for fisheries management in protected areas. In von Nordheim, H. & Wollny-Goerke, K. (eds) Proceedings of the Conference "Progress in Marine Conservation in Europe 2015" in Stralsund, Germany, 14-18 September 2015. Published 2016 and available online: https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript451.pdf.

Stephenson, F., Fitzsimmons, C., Polunin, N.V.C., Mill, A.C., Scott, C.L. (2015). Assessing Long-Term Benthic Impacts of Potting in Northumberland. IN Walmsley, S.F., Bowles, A., Eno, N.C. & West, N. (2015). Evidence for Management of Potting Impacts on Designated Features. MMO1086 Defra Marine Biodiversity Impact Evidence Group (IEG). Final Report pp1 – 111.

Swarbrick, J. & Arkley, K. (2002). The evaluation of ghost fishing preventers for shellfish traps. Seafish Report No SR549. 46 pp.

Tillin, H.M. and Garrard, S.M., 2019. [Nephtys cirrosa] and [Bathyporeia] spp. in infralittoral sand. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 26-03-2021]. Available from: https://www.marlin.ac.uk/habitat/detail/154.

Tyler-Walters, H. & Jackson, A. 1999. Assessing seabed species and ecosystems sensitivities. Rationale and user guide, January 2000 edition. Report to English Nature, Scottish Natural Heritage and the Department of the Environment Transport and the Regions from the Marine Life Information Network (MarLIN). Plymouth, Marine Biological Association of the UK. (MarLIN Report No. 4.).

Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T., 2018. Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, pp. 91. Available from https://www.marlin.ac.uk/publications.

Walmsley, S.F., Bowles, A., Eno, N.C. & West, N. (2015). Evidence for Management of Potting Impacts on Designated Features. MMO1086 Defra Marine Biodiversity Impact Evidence Group (IEG). Final Report pp1 – 111.

Annex 1: Welsh biotopes included in the AWFA potting and Subtidal Sand (High Energy) 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**
SS.SSa.IFiSa.IMoSa	Low	Low
SS.SSa.IFiSa.NcirBat	Low	Low
SS.SSa.IFiSa.ScupHyd	Low	Low
SS.SSa.SSaVS.MoSaVS	Low	Low
SS.SSa.SSaVS.NcirMac	Low	Low