## 26. Circalittoral Mixed Sediments

### Background

Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20m to a maximum depth of 50m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel. Due to the variable nature of the seabed a variety of communities can develop which are often very diverse. A wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as *Cerianthus lloydii* are often present in such habitats and the presence of hard substrata (shells and stones) on the surface enables epifaunal species to become established, particularly hydroids such as *Nemertesia* spp. and *Hydrallmania falcata*. The combination of epifauna and infauna can lead to species rich communities (JNCC, 2022).

**Table 1. Circalittoral Mixed Sediments characterising species defined by Tillin & Tyler-Walters (2013).**

| | Characterising species | MarLIN Link |
|---|---|---|
| Group 1(b) | **Erect, shorter lived epifaunal species** | |
| | *Hydrallmania falcata* | |
| | **Flustra foliacea** | |
| | Nemertesia antennina | |
| | ***Nemertesia ramose*** | |
| Group 1(c) | **Soft-bodied epifaunal species** | |
| | ***Alcyonium digitatum*** | https://www.marlin.ac.uk/species/detail/1187 |
| | **Urticina feline** | https://www.marlin.ac.uk/species/detail/1392 |
| Group 1(d) | **Small epifaunal species with hard or protected bodies** | |
| | **Pomatoceros triqueter** | |
| Group 2 | **Temporary or permanently attached surface dwelling or shallowly buried larger bivalves** | |
| | **Modiolus modiolus** | |
| Group 3 | ***Mobile predators and scavengers*** | |
| | Pagurus bernhardus | |
| | Asterias rubens | https://www.marlin.ac.uk/species/detail/1194 |
| Group 4 | **Infaunal very small to medium sized suspensions and/or deposit feeding bivalves** | |
| | *Mysella bidentata* | |
| | **Thyasira flexuosa** | |

| | | |
|---|---|---|
| **Group 5** | **Small-medium suspension and/or deposit feefing polychaetes** | |
| | *Chaetozone setosa* | |
| | *Owenia fusiformis* | https://www.marlin.ac.uk/species/detail/1703 |
| | *Scalibregma inflatum* | |
| | ***Spiophanes bombyx*** | https://www.marlin.ac.uk/species/detail/1705 |
| | *Scoloplos armiger* | |
| **Group 6** | **Predatory polychaetes** | |
| | *Hesionura elongate* | |
| | *Lumbrineris gracilis (Lumbrineris spp)* | |
| | ***Nephtys hombergii*** | https://www.marlin.ac.uk/species/detail/1710 |
| **Group 8(c)** | **Free living interface suspension/deposit feeders: Ophiuroidea** | |
| | ***Ophiocomina nigra*** | |
| | ***Ophiothrix fragilis*** | https://www.marlin.ac.uk/species/detail/1198 |
| **Group 10** | **Burrowing, soft-bodied species** | |
| | ***Cerianthus lloydii*** | |

*Within each group species (shown in bold) with a good evidence base were selected for specific sensitivity assessment to ensure that the range of biological traits or habitat associations expressed by species within that ecological group were represented.

## Rationale for spatial protection in the Irish Sea

Circalittoral Mixed sediment habitats were included in the features list as it is an MSFD priority habitat and is a broadly distributed feature of ecological importance within the Irish Sea. This habitat hosts a  wide range of species, contributing to the biodiversity of Irish waters. These broadscale habitats do not have existing protection or management but Ireland has a legal obligation under MSFD to protect them and they are amenable to spatial protection.

## Sensitivity Assessment

*Sensitivity scores and the ecological groups associated were similar among MSFD habitats.

**Circalittoral mixed sediments are moderately and highly sensitive to pressures associated with the construction and operation of offshore renewable infrastructure (medium confidence).** Loss of the physical habitat will result in a loss of biodiversity and lead to changes in the community structure associated with this biotope (high confidence). Ecological group 2 has a high sensitivity to removal of the substratum (medium confidence),

surface abrasion and penetration of the substratum (low confidence). The process of extraction is considered to remove all members of this ecological group as they are either sessile or slow moving. Recovery will be mediated by the scale of the disturbance and the suitability of the sedimentary habitat remaining. This ecological group represents larger epifaunal bivalves or those that are shallowly buried with part of the shell projecting above the surface and are therefore directly exposed to abrasion and sub-surface damage. This ecological group is also highly sensitive to heavy smothering and siltation changes (low confidence). As the members of this ecological group are shallowly buried this ecological group would be buried by the deposit. The intensity and duration of siltation will be mediated by site-specific hydrodynamic conditions, such as water- flow and wave action. Based on the laboratory studies by Last *et al* (2011) and Szostek *et al* 2013, this ecological group was considered to be unable to vertically migrate through a layer of overburden at the pressure benchmark level, that is, 30cm of fine material and therefore has been assessed as highly sensitive (Tillin & Tyler-Walters, 2014).

**Circalittoral mixed sediments are moderately and highly sensitive to pressures associated with the fishing sector (low confidence).** As mentioned above, ecological group 2 is highly sensitive to abrasion and penetration of the substratum (medium confidence). Groups 2 and 4, which include suspension feeders, are moderately sensitive to a change in suspended solids (medium confidence). The change is chronic and sustained for a year and is predicted to have negative impacts on growth and fecundity by reducing filter feeding efficiency and imposing costs on clearing and producing pseudofaeces for the filter feeders (Tillin & Tyler-Walters, 2014).

**Circalittoral mixed sediments are moderately sensitive to pressure associated with the shipping sector (high confidence).** A number of characterising species were assigned a medium sensitivity to chemical pressures associated with the shipping sector (high confidence). Asterias rubens, *Nephtys hombergii* and *Ophiothrix* fragilis have a medium sensitivity to hydrocarbon and PAH contamination while *Spiophanes bombyx* has a medium sensitivity to synthetic compound contamination. These pressures have been assessed based on a few characterising species where sensitivity analyses were already available. In addition, some pressures associated with shipping have not been assessed or no evidence is available for this biotope. Further research is needed to determine the true sensitivity of this biotope to shipping activities.

## Further research needs

As with the other MSFD broadscale habitats, a better evidence base is needed as to the actual suite of species, particularly characterising species present in the habitats in the western Irish Sea. In addition, a number of the pressures in the analyses for the broadscale habitats are scored based on the sensitivity of a small number of characterising species due to a lack of evidence for others. Further research is needed to assess the sensitivity of the full list of characterising species present to provide a more comprehensive analysis for each biotope.

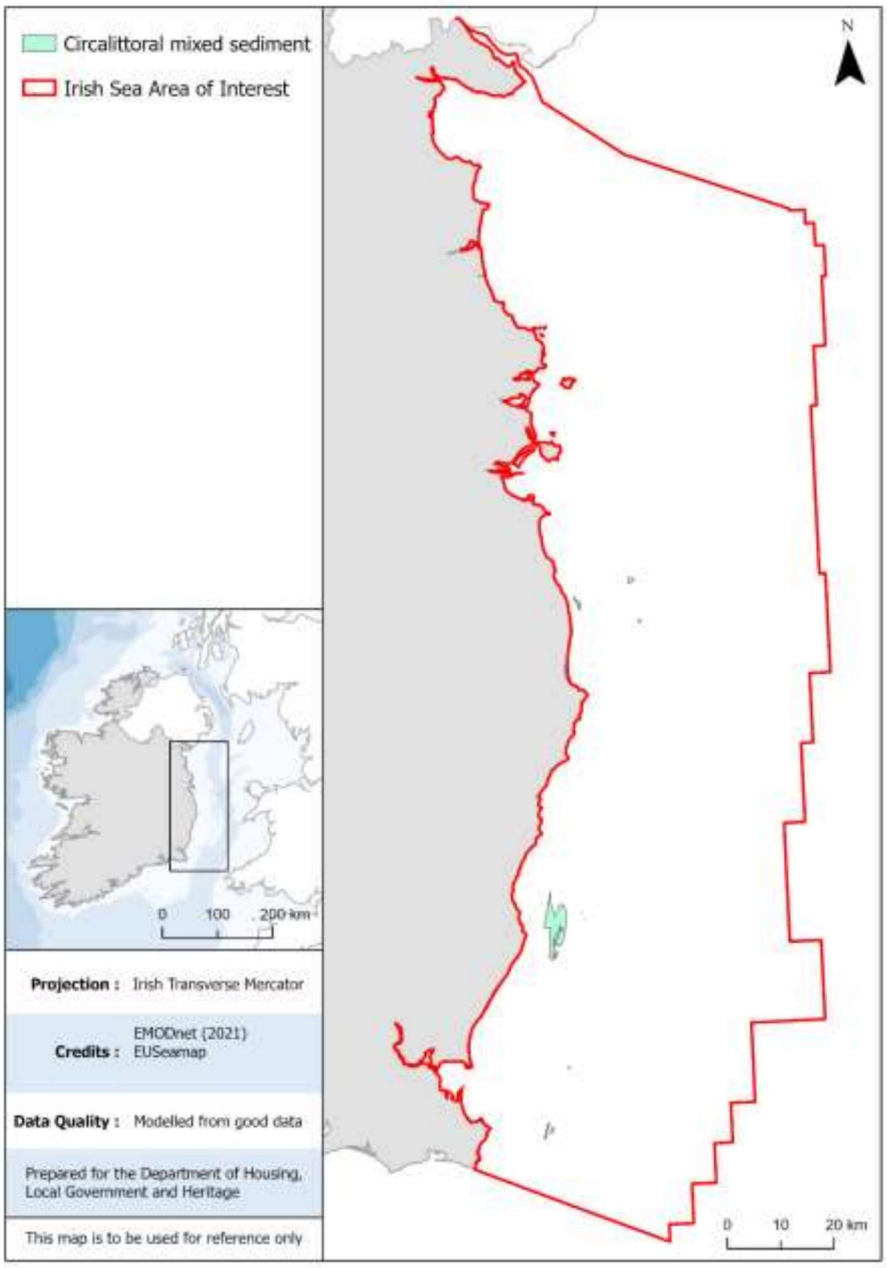


Figure 1. Data available for circalittoral mixed sediments in the western Irish Sea.

## Data sources and quality

### 26. Circalittoral mixed sediments

| Dataset Name | Data Owning | Dataset | Metadata | Comments |
|---|---|---|---|---|

| | Organisation | Quality | URL | |
|---|---|---|---|---|
| EUSeaMap EMODnet Benthic Broadscale Habitat Types | EMODnet | Modelled from good data | EUSeamap (2021) | |

**Information on the sensitivity assessment above has been sourced from:**

Tillin, H.M. & Tyler-Walters, H. (2014). Assessing the sensitivity of subtidal sedimentary habitats to pressures associated with marine activities: Phase 2 Report – Literature review and sensitivity assessments for ecological groups for circalittoral and offshore Level 5 biotopes**.** JNCC Report 512B

## References


JNCC (2022) The Marine Habitat Classification for Britain and Ireland Version 22.04. Available from: https://mhc.jncc.gov.uk/

Last, K.S., Hendrick, V.J., Beveridge, C.M. & Davies, A.J. (2011). Measuring the effects of suspended particulate matter and smothering on the behaviour, growth and survival of key species found in areas associated with aggregate dredging. *Report for the Marine Aggregate Levy Sustainability Fund. Project MEPF 08/P76*. 69 pp. Available from: www.alsf-mepf.org.uk

Szostek, C.L., Davies, A.J. & Hinz, H. (2013). Effects of elevated levels of suspended particulate matter and burial on juvenile king scallops Pecten maximus. *Marine Ecology Progress Series*, **474**, 155-165.

Tillin, H, Tyler-Walters, H. (2013). Assessing the sensitivity of subtidal sedimentary habitats to pressures associated with marine activities. Phase 1 Report: Rationale and proposed ecological groupings for Level 5 biotopes against which sensitivity assessments would be best undertaken JNCC Report No. 512A

Tillin, H.M. & Tyler-Walters, H. (2014). Assessing the sensitivity of subtidal sedimentary habitats to pressures associated with marine activities: Phase 2 Report – Literature review and sensitivity assessments for ecological groups for circalittoral and offshore Level 5 biotopes**.** JNCC Report 512B