24. Infralittoral mud

**Background**

Infralittoral mud can be found from the extreme lower shore to about 20 m depth, predominantly in extremely sheltered areas with very weak tidal currents. Infaunal records for this habitat are limited and dominant species vary according to environmental conditions. Some areas are dominated by bivalves such as *Cerastoderma edule* and *Abra nitida*, others have dense populations of lugworm, *Arenicola marina* or the sand slug, *Philine aperta*. The extent of the oxidised layer may be shallow with some areas being periodically or permanently anoxic, limiting infaunal communities. In these areas bacterial mats may develop on the sediment surface (JNCC, 2022).

Table A10.24.1. Infralittoral mud ecological groups. Characterising species within those groups on which each group sensitivity assessment and/or individual pressure sensitivities were based are listed. Species in bold are characterising species for the ecological group as described in Tillin & Tyler-Walters (2014). Sensitivity scores were obtained for selected species from [1] Tyler-Walters (2007), [2] Hill (2008), [3] Neal & Pizzolla (2008), [4] Budd (2008a), [5] Tyler-Walters (2008), [6] Rayment (2007), [7] Budd (2008b) for pressures not considered by Tillin & Tyler-Walters (2014), i.e., transition elements & organo-metal contamination, hydrocarbon & Polycyclic Aromatic Hydrocarbon (PAH) contamination, synthetic compound contamination, de-oxygenation, smothering and siltation changes (light). There was no overlap between species in groups 1(b), 1(d), and 8(a) present in Infralittoral mud and those used to characterise these ecological groups in Tillin & Tyler-Walters, so sensitivity of these groups is based on the overall sensitivity of the groups as described by Tillin & Tyler-Walters (2014).

| Group number | Group description | Characterising species |
|---|---|---|
| Group 1(a) | Sea pens | ***Virgularia mirabilis, Pennatula phosphorea*** |
| Group 1(b) | Erect, shorter lived epifaunal species | |
| Group 1(c) | Soft-bodied epifaunal species | ***Ascidiella aspersa, Alcyonium digitatum*** |
| Group 1(d) | Small epifaunal species with hard or protected bodies | |
| Group 2 | Temporary or permanently attached surface dwelling or shallowly buried larger bivalves | *Cerastoderma edule*[1], |
| Group 3 | Mobile predators and scavengers | *Liocarcinus depurator*[2], *Carcinus maenas*[3], ***Asterias rubens***[4], ***Pagurus bernhardus*** |
| Group 4 | Infaunal very small to medium sized suspension and/or deposit feeding bivalves | ***Abra nitida*** |

| | | |
|---|---|---|
| Group 5 | Small-medium suspension and/or deposit feeding polychaetes | *Arenicola marina*[5], *Aphelochaeta marioni*[6] |
| Group 6 | Predatory polychaetes | *Hediste diversicolor*[7] |
| Group 8(a) | Echinoderms - sub-surface urchins | |
| Group 8(b) | Echinoderms - surfaceurchins | ***Echinus esculentus*** |
| Group 8(c) | Ophiuroids (free-living interface suspension/deposit feeders) | ***Amphiura filiformis, Ophiothrix fragilis, Ophiura albida*** |
| Group 10 | Burrowing, soft-bodied species | ***Cerianthus lloydii*** |

**Rationale for spatial protection in the Celtic Sea**

Infralittoral mud is included in the feature list as it is a Marine Strategy Framework Directive (MSFD) priority habitat and is a broadly distributed feature of ecological importance within the Celtic 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.

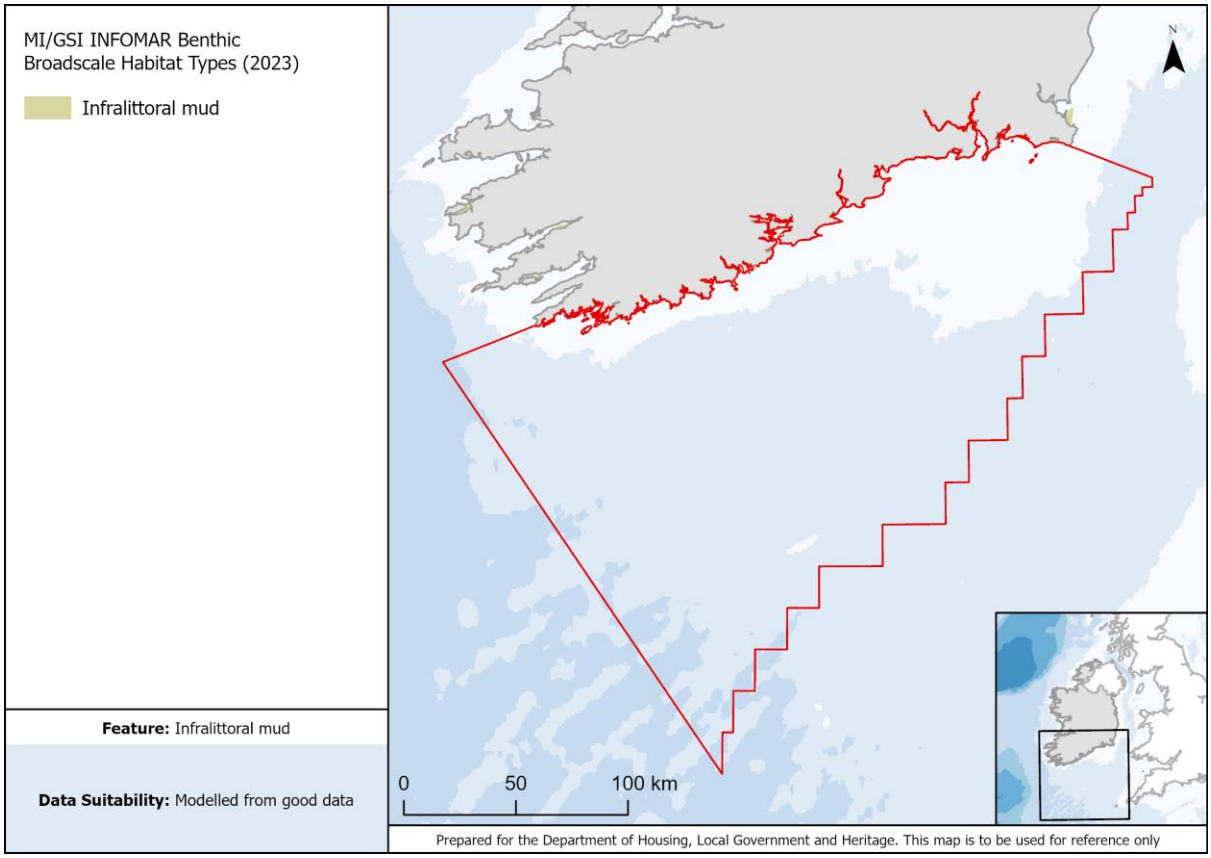


Figure A10.24.1. Data available for infralittoral mud in the Celtic Sea.

**Sensitivity Assessment**

**Infralittoral mud is highly sensitive to pressures associated with the construction and operation of offshore wind farms**. All marine habitats and benthic species are highly sensitive to the pressure 'physical loss (to land of freshwater habitat)', with a resistance of None and no resilience. Infralittoral mud is highly sensitive to change to another seabed type. A permanent change from sediment to artificial hard substratum would change the habitat classification, meaning a resistance and resilience of 'None'.

**Infralittoral mud is moderately sensitive to pressures associated with the fishing sector.** Species of ecological groups 2, 4 and 10 are sediment surface dwelling or shallowly buried species. Abrasion of the surface is likely to damage or kill a proportion of the populations of these species; those that are shallowly buried have some protection. Penetration or disturbance of the substratum subsurface is likely to kill, damage, or remove members of ecological groups 2, 4, 5, 8(a) and 10. Recovery is likely within 2 – 10 years (Medium resilience), meaning they have Medium sensitivity to the pressure. Sensitivity to a change in suspended solids is Medium for ecological groups 2 and 4. If changes are sustained for a year (the pressure benchmark), this will have negative impacts on growth and fecundity by reducing filter feeding efficiency and imposing costs on clearing and producing pseudofaeces (Tillin & Tyler-Walters, 2014). All the pressures mentioned above are also associated with ORE.

**Infralittoral mud is moderately sensitive to pressures associated with shipping.** *Asterias rubens* and *Carcinus maenas* have Medium sensitivity to hydrocarbon and PAH contamination. *Hediste diversicolor, Aphelochaeta marioni and Arenicola marina* have Medium sensitivity to synthetic compound contamination. *Hediste diversicolor* has Medium sensitivity to transition elements & organo-metal contamination. All three of these pressures can also be associated with ORE and the fishing sector.

**Data sources available**

See Figure A10.24.1 for data available for this broadscale habitat type in the Celtic Sea. This layer was used in prioritization analyses.

**Further research needs**

As with other MSFD broadscale habitats, better evidence is needed as to which species particularly characterise these habitats in the Celtic Sea. In addition, some 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 relevant characterising species present to provide a more comprehensive analysis for each

ecological group. Genetic data on characterising species could help identify populations with high genetic variability or distinctness, and provide information on connectivity among populations. An integrated approach where genetic data are used in combination with sensitivity and conservation prioritization analyses could provide more comprehensive spatial protection.

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