20. Circalittoral mud

Background

Circalittoral mud occurs below moderate depths of 15-20 m and to a maximum depth of 50 m, either on the open coast or in marine inlets such as sea lochs. The sea pens *Virgularia mirabilis* and *Pennatula phosphorea* are characteristic of this biotope complex together with the burrowing anemone *Synarachnactis lloydii* and the ophiuroid *Amphiura* spp. The relatively stable conditions often lead to the establishment of communities of burrowing megafaunal species, such as *Nephrops norvegicus* (JNCC, 2022).

Table A10.20.1. Circalittoral mud ecological groups. Characterising species within those groups on which each group sensitivity assessment was based are listed. For a full list of species characterising each ecological group of subtidal sedimentary habitats, see Tillin & Tyler-Walters (2013). Sensitivity scores were obtained for selected species from [1] Ager (2003), [2] Wilson & Hill (2000), [3] Budd (2008), [4] Budd (2004) [5] Hill & Wilson (2008) [6] Hill & Sabatini (2008) for pressures not considered by Tillin & Tyler-Walters (2014), i.e., transition elements & organo-metal contamination, hydrocarbon & Polycyclic Aromatic Hydrocarbons (PAH) contamination, synthetic compound contamination, introduction of other substances, deoxygenation, smothering and siltation changes (light).

Group number	Group description	Characterising species
Group 1(a)	Sea pens (erect, large, longer-lived epifaunal species with some flexibility)	*Pennatula phosphorea,* *Funiculina quadrangularis*[1], *Virgularia mirabilis*[2]
Group 3	Mobile epifauna, mobile predators and scavengers	*Asterias rubens*[3]
Group 5	Small-medium suspension and/or deposit feeding polychaetes	*Chaetozone setosa*
Group 6	Predatory polychaetes	*Paramphinome jeffreysii*
Group 8(a)	Echinoderms - sub-surface urchins	*Brissopsis lyrifera*[4]
Group 8(c)	Ophiuroids (free-living interface suspension/deposit feeders)	*Amphiura filiformis*[5]

Group 9	Burrowing, hard-bodied species	*Nephrops norvegicus*[6], *Calocaris macandreae*
Group 10	Burrowing, soft-bodied species	*Synarachnactis lloydii*

Rationale for spatial protection in the Celtic Sea

Circalittoral mud was 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. Broadscale habitats do not have existing protection or management, but Ireland has a legal obligation under the MSFD to protect them and they are amenable to spatial protection.

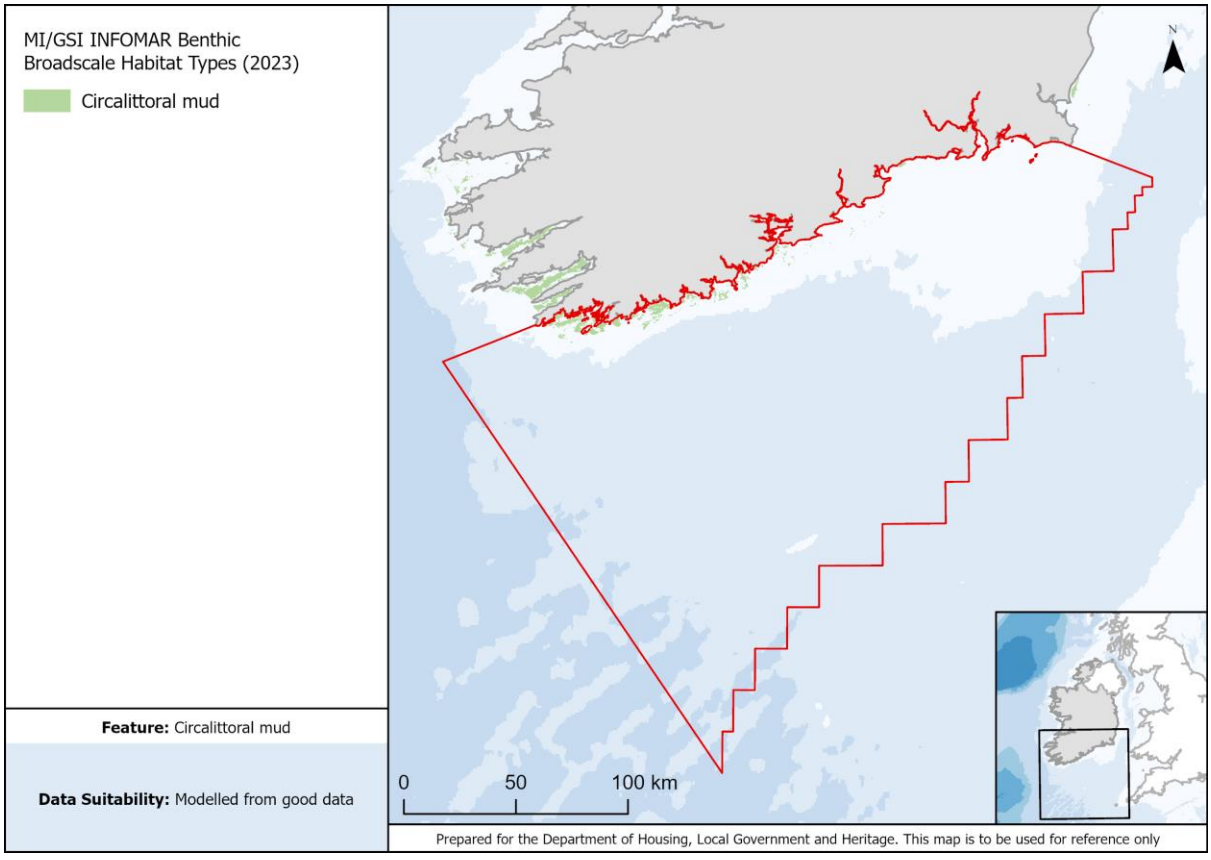

Figure A10.20.1. Data available for circalittoral mud in the Celtic Sea.

Sensitivity Assessment

Circalittoral mud is highly sensitive to pressures associated with the construction and operation of offshore wind farms. Loss or change of the physical habitat could lead to a loss of biodiversity and

lead to changes in the community structure associated with this habitat (medium confidence). A change in sediment type will adversely affect sea pens. Based on their reported distribution a change of 'mud' to 'sandy mud' or 'slightly gravelly mud' will probably exclude *P. phosphorea* and *F. quadrangularis* (medium confidence) (Tillin & Tyler-Walters, 2014). In addition, characterising species within group 1(a) have a high sensitivity to a change in habitat structure through extraction of the substratum (medium confidence). An extraction of sediment to 30 cm (the benchmark) will remove most of the resident sea pens present and recovery is expected to be low (Tillin & Tyler-Walters, 2014).

Circalittoral mud is highly sensitive to pressures associated with the fishing sector. Species in ecological group 1(a) that are present in circalittoral muds have a high sensitivity to fishing pressures, mainly abrasion/disturbance of substratum surface or seabed and penetration or disturbance of substratum subsurface. Both pressures come from trawling and dredging. Surface abrasion is unlikely to affect the three sea pen species within the group to the same extent. *Virgularia mirabilis* and *P. phosphorea* can avoid abrasion by withdrawing into the sediment, but frequent disturbance will probably reduce feeding time and hence viability. *Funiculina quadrangularis,* the tallest of all three of the sea pens (up to 2 m), cannot withdraw and is the most likely to be displaced or removed by surface abrasion. Penetration or disturbance of substratum subsurface by towed gear is likely to remove a proportion of sea pens from the sediment. If damaged, sea pens are likely to die, but they can recover relatively quickly if displaced undamaged and returned to suitable sediment (Tillin & Tyler-Walters, 2014). Given the evidence, resistance and resilience for this ecological group against abrasion and penetration of the sediment was scored as low, resulting in a high sensitivity. Due to the ability for two of the species to retract, the concordance of the evidence is low.

Circalittoral mud is moderately sensitive to pressures associated with the shipping sector. A small number of characterising species were assigned a medium sensitivity to chemical pressures associated with the shipping sector (high confidence). *Asterias rubens* (Budd, 2008), and *Amphiura filiformis* (Hill & Wilson, 2008) have a medium sensitivity to hydrocarbon and PAH contamination while *Brissopsis lyrifera* (Budd, 2004) and *Amphiura filiformis* have 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 habitat. Further research is needed to determine the true sensitivity of this habitat to shipping activities.

Data sources available

See Figure A10.20.1 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 this habitat in the Celtic Sea. In addition, several 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 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.

References

Ager, O.E.D. (2003). *Funiculina quadrangularis* The tall sea pen. In Tyler-Walters, H. (ed) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Marine Biological Association of the United Kingdom, Plymouth. [cited 15-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1154

Budd, G.C. (2004). *Brissopsis lyrifera* Spiny mudlark. In Tyler-Walters, H. (ed) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Marine Biological Association of the United Kingdom, Plymouth. [cited 09-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1654

Budd, G.C. (2008). *Asterias rubens* Common starfish. In Tyler-Walters, H. (ed) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Marine Biological Association of the United Kingdom, Plymouth. [cited 09-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1194

Hill, J.M., & Sabatini, M. (2008). *Nephrops norvegicus* Norway lobster. In Tyler-Walters, H. (ed) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Marine Biological Association of the United Kingdom, Plymouth. [cited 15-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1672

Hill, J.M., & Wilson, E. (2008). *Amphiura filiformis* A brittlestar. In Tyler-Walters, H. (ed) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Marine Biological

Association of the United Kingdom, Plymouth. [cited 09-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1400

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

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*. Joint Nature Conservation Committee, JNCC Report No. 512A, Peterborough, 68 pp.

Tillin, H., & 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*. Joint Nature Conservation Committee, JNCC Report No. 512B, Peterborough, 260 pp

Wilson, E., & Hill, J.M. (2000). *Virgularia mirabilis* Slender sea pen. In Tyler-Walters, H. (ed) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Marine Biological Association of the United Kingdom, Plymouth. [cited 15-04-2024]. Available from: https://www.marlin.ac.uk/species/detail/1396