24. Sub-tidal Mussel Beds *(Mytilus edulis)*

Irish name: Diúilicín

Figure 1: *Mytilus edulis* © Dr Keith Hiscock

Background

The shell of M. edulis is roughly triangular in outline, however, shell shape varies considerably with environmental conditions. It is smooth with a sculpturing of concentric lines but no radiating ribs and is usually purple or blue. Length varies, with specimens usually ranging from 5 -10 cm although some populations never attain more than 2-3 cm, and the largest specimens may reach 15 -20 cm (Tyler-Walters, H. 2008). Shallow sublittoral mixed sediment, in fully marine coastal habitats or sometimes in variable salinity conditions in the outer regions of estuaries, are characterised by beds of the common mussel *Mytilus edulis*. Other characterising infaunal species may include the amphipod *Gammarus salinus* and oligochaetes of the genus *Tubificoides*. The polychaetes *Harmothoe* spp., *Kefersteinia cirrata* and *Heteromastus filiformis* are also important. Epifaunal species include the whelks *Nucella lapillus* and *Buccinum undatum*, the common starfish *Asterias rubens*, the spider crab *Maja squinado* and the anemone *Urticina felina* (Tyler-Walters et al., 2022).

Rationale for spatial protection in the western Irish Sea

Sub-tidal mussel beds were nominated for inclusion on the features list with particular reference to its ecological importance. *Mytilus edulis* is an active suspension feeder on organic particulates and dissolved organic matter. The production of faeces and pseudofaeces enriches the underlying sediment providing a rich food source for infauna detritivores, deposit feeders, meiofauna and bacteria. Dense beds of suspension feeding bivalves are important in nutrient cycling in estuarine and coastal ecosystems, transferring phytoplankton primary production and nutrients to benthic secondary production (pelagic-benthic coupling)

(Dame, 1996). The organic rich 'mussel mud' provides a food source for deposit feeding polychaetes (e.g., *Scoloplos armiger* and *Capitella capitata* and oligochaetes (e.g. *Tubificoides* spp.) and surface deposit feeders (e.g., *Polydora* spp. and *Macoma baltica).* The interstices within the mussel matrix and mussel mud support epifaunal and infaunal predators such as scale worms (e.g., *Harmothoe* spp.), nereids (e.g. *Nephtys* spp.) and other polychaetes and nemerteans (Tyler-Walters et al., 2022).

Sub-tidal mussel beds are amenable to spatial protection and the western Irish Sea is a significant part of its distribution.

Sensitivity assessment

Although a wide range of species are associated with *Mytilus edulis* reef or bed biotopes these characterising species occur in a range of other biotopes and are therefore not considered to be obligate associates. *Mytilus edulis* beds are not dependent on associated species to create or modify habitat, provide food or other resources, although their loss would represent a loss of diversity. It should be noted that for attached organisms the sensitivity of the *Mytilus edulis* biotope would be of primary concern as removal of the reef would also lead to removal of the attached species. The sensitivity assessments are therefore based on *Mytilus edulis* and only consider the sensitivity of associated species where they might augment any impact or cause secondary impacts (Tyler-Walters et al., 2022).

Sub-tidal mussel beds are highly sensitive to the construction and operation of ORE (medium confidence). All marine habitats and benthic species are considered to have a resistance of 'None' to physical loss (to land or freshwater habitat) and to be unable to recover from a permanent loss of habitat (resilience is 'Very Low')(high confidence)(Tyler-Walters et al., 2018). Sub-tidal mussel beds have a high sensitivity to habitat structure change as the process of extraction will remove the entire mussel bed and the associated community(medium confidence). Additionally, *M. edulis* are highly sensitive to a number of the chemical pressures associated with the construction and operation of offshore wind farms (medium confidence). For example, Across the entire 'Transitional elements & organometal' contaminant group, there is evidence that several metals, one nanoparticulate metal, and some organometals have been reported to cause 'severe' (>75%) mortalities in adult and juvenile mussels.

Sub-tidal mussel beds are highly sensitive to pressures associated with the fishing sector (medium confidence). As mentioned above, M. edulis has a high sensitivity to chemical pressure, including hydrocarbon and PAH contamination, synthetic compound contaminants and Transition elements and organo-metals (medium confidence). This biotope is also moderately sensitive to abrasion and penetration of the substratum (medium confidence). *Mytilus edulis* lives on the surface of the seabed held by byssus threads attached to either the substratum or to other mussels in the bed. Activities resulting in abrasion and disturbance can either directly affect the mussel by crushing them, or indirectly affect them by the weakening or breaking of their byssus threads making them vulnerable to displacement (Denny, 1987). The activities that penetrate the seabed could result in removal of part of a bed and its associated fauna and flora.(Tyler-Walters et al., 2022).

Sub-tidal mussel beds are highly sensitive to shipping related pressures such as the chemical pressures previously mentioned and the introduction or spread of invasive non-

indigenous species (medium confidence). As described by Tyler-Walters et al. (2022), a number of species have shown to negatively impact *M. edulis* by competing for space and food and reducing growth rates, potentially leading to reduced abundance of mussels.

Further research needs

Information on the effects of electromagnetic energy and the introduction of other substances were not assessed due to a lack of evidence.

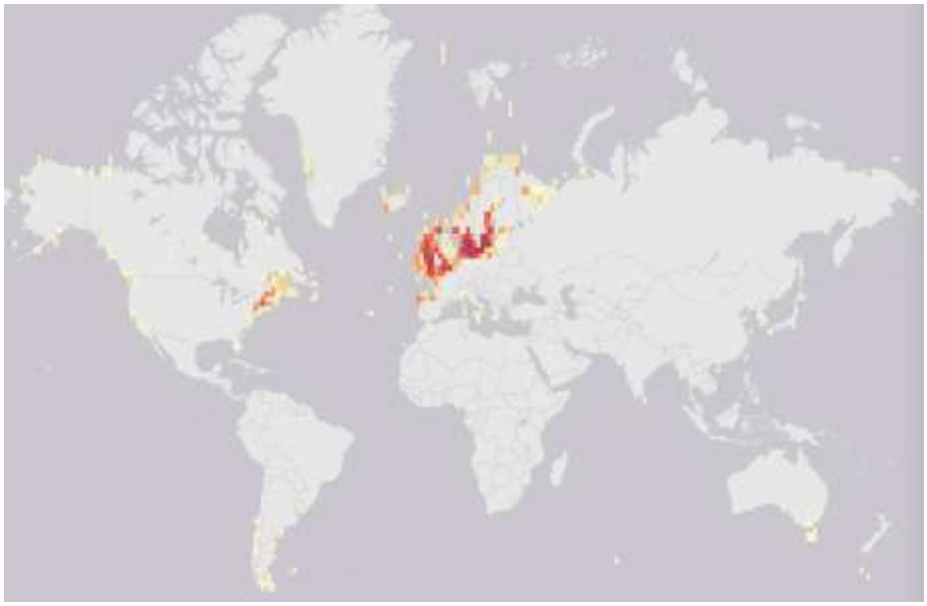

Figure 2. Global distribution of *Mytilus edulis*, Source:

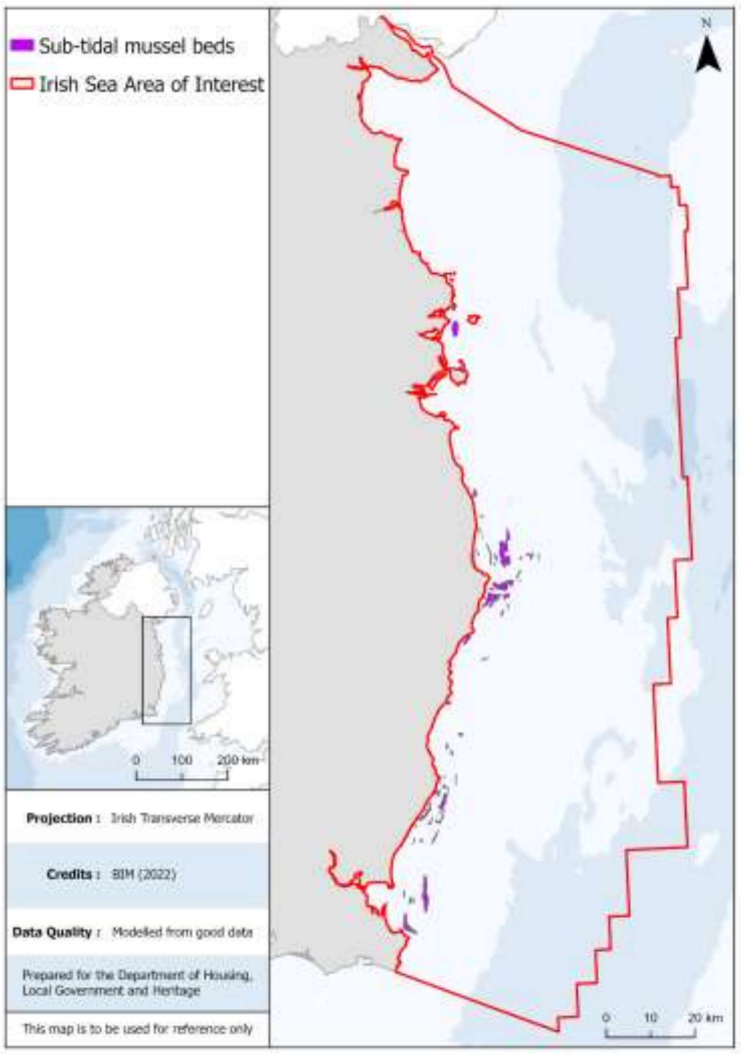

Figure 3. Data available for Sub-tidal mussel beds, *Mytilus edulis* in the western Irish Sea

Data sources and quality

Dataset Name	Data Owning Organisation	Dataset Quality	Metadata URL	Comments
Bord Iascaigh Mhara (BIM) Seed Mussel Beds	Bord Iascaigh Mhara	Modelled from good data		

References

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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. https://www.marlin.ac.uk/assets/pdf/MarESA-Sensitivity-Assessment-Guidance-Rpt-Dec2018.pdf

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