

36. Sea pen and burrowing megafauna communities



Figure A10.36.1. *Pennatula phosphorea* in soft sediment . © [Yoruno](#), [CC BY-SA 3.0](#)

Background

Sea pen and burrowing megafauna communities occur in fine mud at 15-200 m or more. The burrowing megafauna heavily bioturbate the sediment such that burrows and mounds are typically prominent on the sediment surface. Sea pens, typically *Virgularia mirabilis*, *Pennatula phosphorea*, and in undisturbed soft mud *Funiculina quadrangularis*, can be abundant. The burrowing megafauna can include crustaceans such as *Nephrops norvegicus*, *Calocaris macandreae* and *Callinassa subterranea*, the urchin *Brissopsis lyrifera*, polychaetes, and bivalves. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration (OSPAR Commission, 2010).

Rationale for spatial protection in the Celtic Sea

Sea pen and burrowing megafauna communities were nominated for inclusion with particular reference to its listing under OSPAR. This biotope is considered to be in decline and/or threatened in OSPAR region III, Celtic Seas. There is good evidence that this habitat, which is not currently protected or conserved in the Celtic Sea, is negatively affected by anthropogenic activities that disturb the sediment, and this habitat would therefore benefit from spatial protection.

Sensitivity assessment

Sea pen and burrowing megafauna communities are highly sensitive to pressures associated with the construction and operation of offshore wind farms. 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). This biotope also has a high sensitivity to physical change to the seabed (high confidence) and sediment type (medium confidence). If sedimentary substrata were replaced with rock or artificial substrata the biotope would be lost, as the habitat would no longer be sedimentary habitat and could not support the characterising taxa. Additionally, sea pens have a narrow range of sediment type preferences and given that this pressure is a permanent change, resilience is Very Low (Hill et al., 2023). A permanent change in sediment type would also exclude many of the burrowing megafauna as they have very specific sediment requirements, e.g., *Nephrops norvegicus* only inhabits soft muds. The habitat is highly sensitive to the pressure 'habitat structure change-removal of substratum (extraction)' as extraction would remove most, if not all, sea pens and burrowing fauna; hence resistance to this pressure is None and resilience is Low.

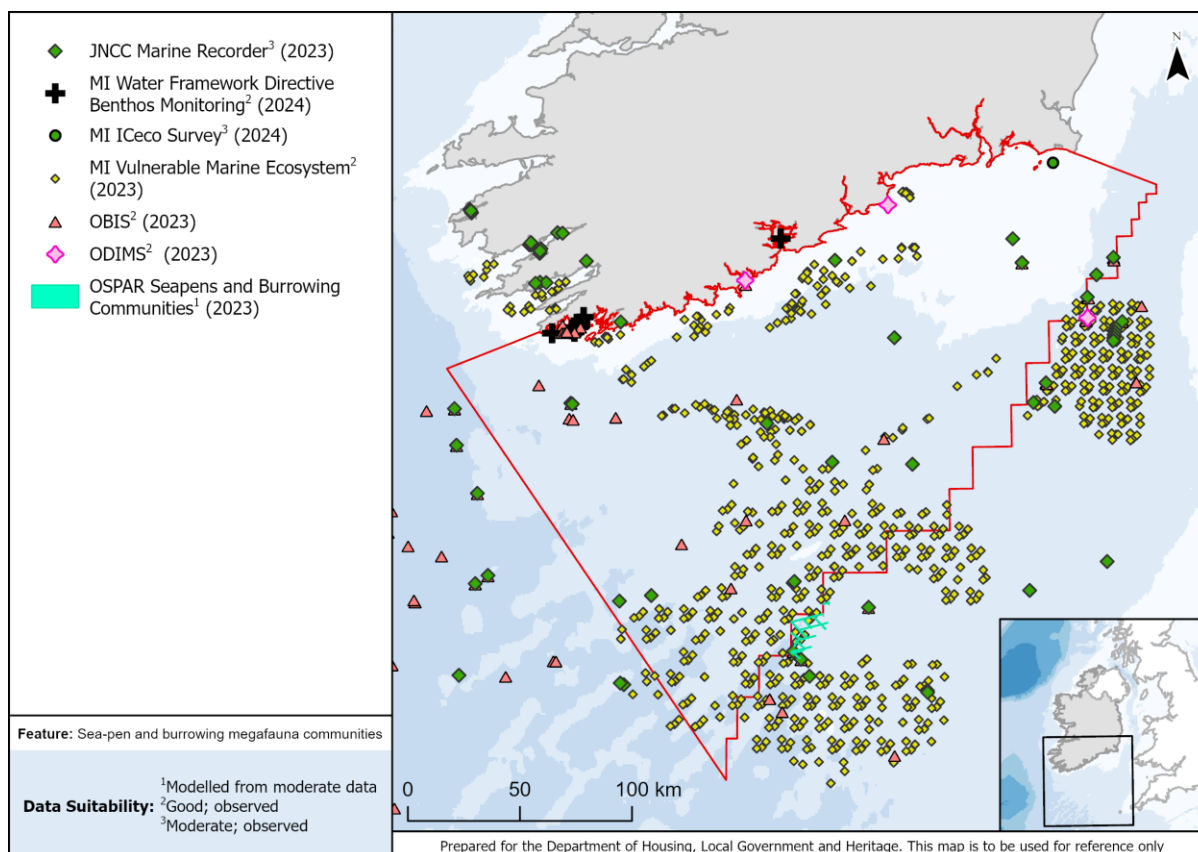


Figure A10.36.2. Data available on the distribution of Sea Pens and Burrowing Megafauna Communities in the Celtic Sea.

Sea pen and burrowing megafauna communities are highly sensitive to activities associated with the fishing sector. As mentioned above, this habitat has a high sensitivity to physical change to the seabed (high confidence) and sediment type (medium confidence). It has a medium sensitivity to abrasion (low confidence) but a high sensitivity to penetration of the substratum (low confidence). *Virgularia mirabilis* and *Pennatula phosphorea* can avoid abrasion by withdrawing into the sediment, but a frequent disturbance will probably reduce feeding time and hence viability. Penetrative gear is likely to remove, damage, or kill a proportion of the sea pen population within the footprint of the activity, as withdrawing into the sediment offers no protection (Hill et al., 2023).

Sea pen and burrowing megafauna communities are highly sensitive to activities associated with shipping. They are highly sensitive to the chemical pressures 'transition elements & organo-metal contamination', 'hydrocarbon & PAH contamination', 'synthetic compound contamination', and 'introduction of other substances'. Most of the evidence for the sensitivities of sea pen and burrowing megafauna communities to the chemical pressures associated with shipping industry comes indirectly from the sensitivities of Anthozoa (Hill et al., 2023) and therefore the results are of low confidence.

Data sources available

Data sources for sea pen and burrowing megafauna in the Celtic Sea AOI that were available to the MPA Advisory Group, and the quality / suitability of those data for conservation prioritization analyses (See Table 3.2.1 Main Report), are shown in Figure A10.36.2. For information on how data were prepared for use in prioritization analyses, and for visualisation of layer used, see Appendix 5e, section 5e.4.

Further research needs

The sea pen and burrowing megafauna communities are understudied in the context of the Celtic Sea and research into their distribution and the species, particularly infaunal species, that characterise them is required. There is a lack of evidence on the effect of the introduction or spread of invasive and/or non-indigenous species on sea pen and burrowing megafauna communities. More detailed studies are needed to examine the direct effects of chemical pressures on the individual species that make up sea pen and burrowing megafauna communities. Only indirect evidence could be found, and only for one group, the sea pens, therefore a more species-specific approach is needed to fully assess implications of these pressures on the habitat.

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>