

Biomass survey of the seed mussel settlement south of Wicklow Head – 29 & 30/08/2024

Methodology:

The biomass estimation survey was carried out using 0.1m² Day grab to collect samples on location randomly generated within the predefined boundaries of beds. The data collected was interpolated using the IDW (Inverse Distance Weighting) tool in ArcGIS (Hervas *et al.*, 2008; Chopin, 2024). The spatial data (dredge and grabs) was recorded using ESRI Field Maps with the Arrow 100 GNSS receiver for submeter accuracy.

Area surveyed: Bed identified on the 26/06/2024, south of Wicklow Head. Further survey was carried out on the 2023 settlement area.

Survey details:

Biomass

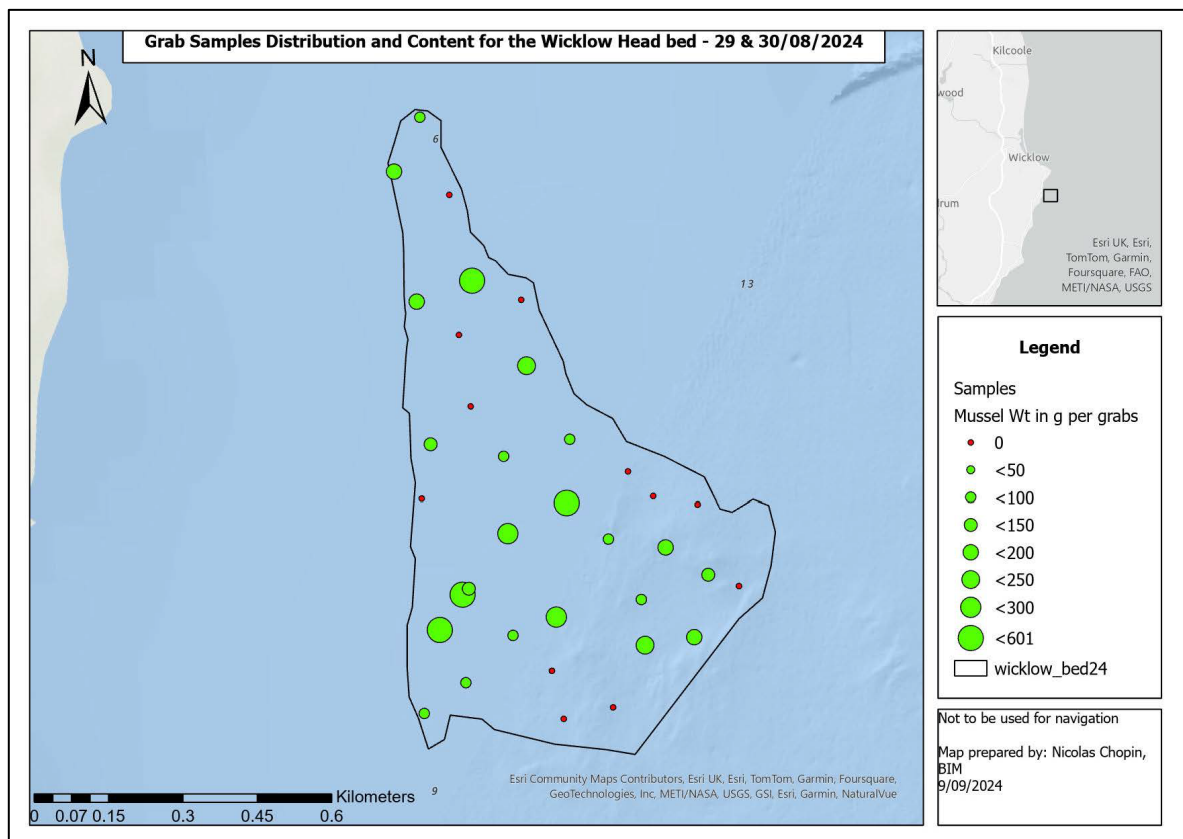
35 sample locations were randomly generated within the identified seed mussel bed (Map 1). 12 grabs did not indicate the presence of seed. The average weight through the 23 remaining grabs was 200g (min: 53g, max: 605g). The average amount of waste (i.e. non-mussel) was 48 % of the overall weight of the grabs (min: 10%, max: 83%). It is mainly composed of small stones, shells ash/ debris, empty mussel shells, coarse sediment (> 1 mm), and mixture of bryozoans and hydroids in small quantities.

Results from the grab sampling indicate that the seed is lightly distributed throughout the bed's established boundaries. The IDW interpolation reflects this, as the densest patches appear isolated (Map 2). Following the analysis of the generated data, it is estimated that this bed could yield **609 metric tonnes for 52 hectares** (see table 1).

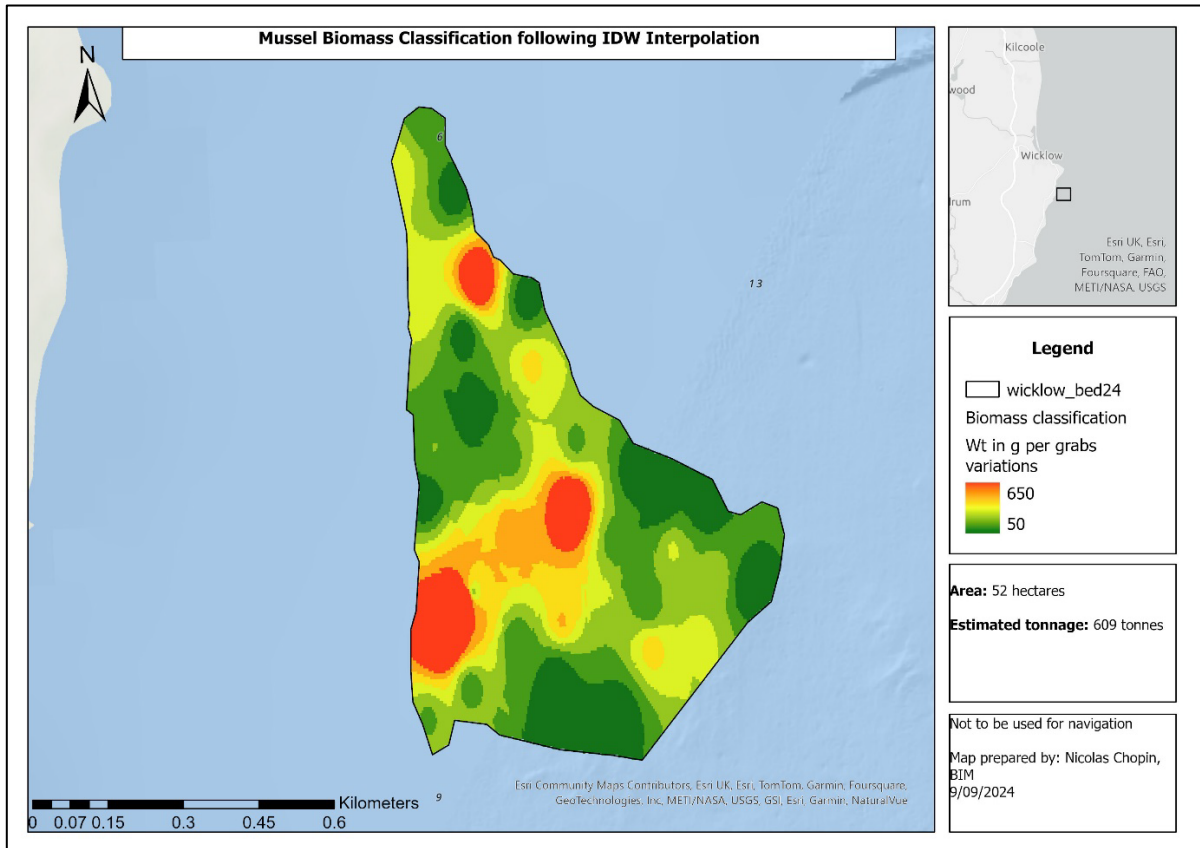


Table 1: Tonnage estimation

Density Classes	Areas in hectares	N samples	Mean Wt per 0.1 m ⁻² in Kg	Tonnes/Area
0 to 50g	9.47	12	0.00	0.00
50 to 100g	12.53	8	0.07	83.86
100 to 150g	11.03	3	0.12	135.97
150 to 200g	8.19	4	0.18	144.92
200 to 250g	4.11	2	0.23	93.98
250 to 300g	3.12	2	0.28	86.85
300 to 400g	2.45	0	0.00	0.00
400 to 500g	1.04	3	0.46	48.13
500 to 650g	0.26	1	0.60	15.69
Total area	52.21		Total tonnage	609.38



Map1: Grabs distribution and content for the Wicklow bed



Map 2: Estimated (IDW) seed mussel density distribution for the Wicklow bed

Biometrics:

To assess the biometrics (length in mm) of the seed mussel in Wicklow, 300 individuals were measured (100 individuals from one single grab, and 2 subsamples of 100 individuals from the pooled grab content). The average size of the seed found on the Wicklow bed at the time of the survey was 32 mm (min: 15.95 mm, max: 44.74 mm). The most common size class (length) in the the sampled mussels was that of 30 and 36 mm (57% of the mussel sampled). The average number of pieces per kilogram is 360.



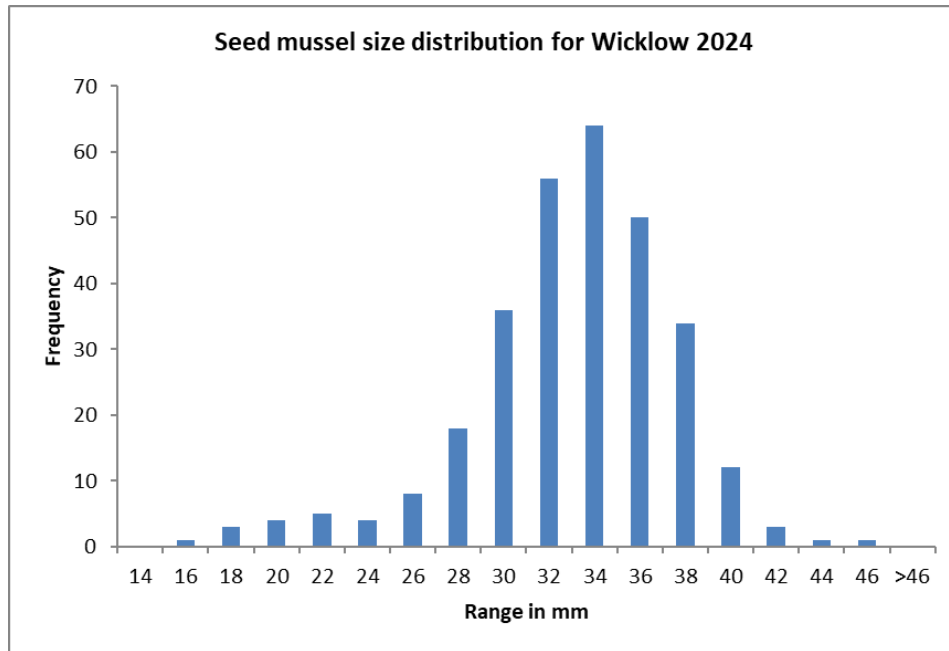


Fig.1: size distribution for the Wicklow bed

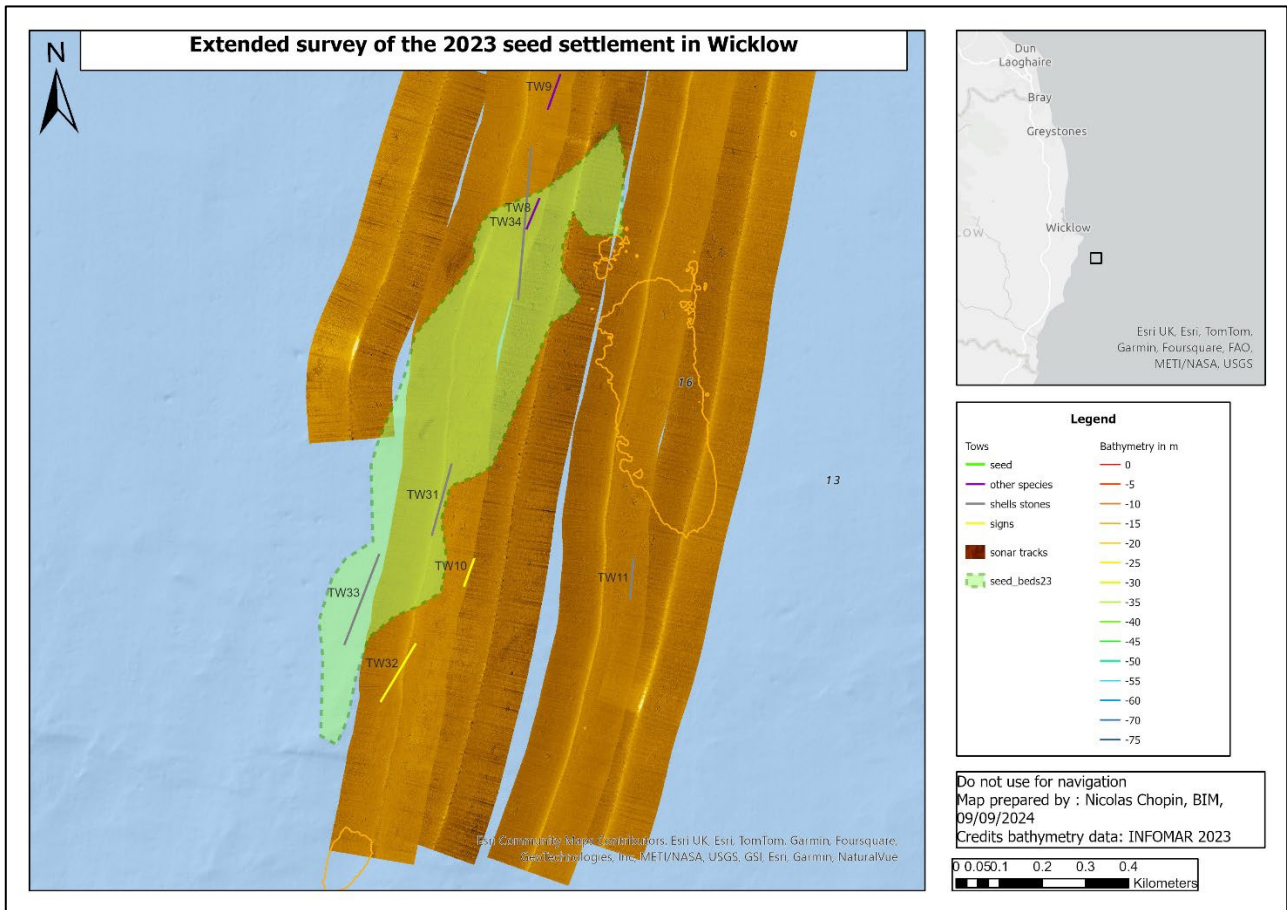
Summary:

The survey of the seed mussel bed in Wicklow indicated that approximately **609 tonnes** of seed is spread over **52 hectares**. The seed is scattered over the area and mortality has been observed, likely due to the presence of few starfish *Asteria rubens* at the location. Although grab sampling tends to generate more waste than dredge sampling, the tows carried out in this area also indicate high levels of waste material. The size of the seed found in this settlement could indicate that the seed settled earlier in 2024 (**average size: 32 mm**).



Extended survey on the 2023 seed mussel at Wicklow Head:

A small settlement was found in 2023 east of Wicklow Head. The survey carried out in September 2023 on the area indicated that the settlement spread over 29 hectares and was yielding 360 tonnes approximately. An acoustic survey was carried in the area at the end of June 2024 but due to the presence of static fishing gear, ground truthing was limited. Three tows (see map 3) were carried on the 30/08/2024 but no remaining seed was found. Some seed mussels were observed in TW34; however, the content of dredge indicated high level of waste (50% of the content). The sample collected from this tow showed that the seed in this location averaged 33.69 mm (min: 13.58 mm, max: 45.47 mm).



Map 3: Extended survey map of the 2023 seed bed in Wicklow

The size of the seed recorded in this area could relate to the smaller class observed in the 2023 bed (**from the 2023 report:** average size was 18.36 mm with min: 10.14 mm, and max: 25.21 mm). However, there were no traces of the larger cohort (44 to 50 mm) found at the time of that survey which represented 34% of the mussel sampled.

Considering that there was no seed fishing in 2023, it is assumed that the settlement was depleted by predation by starfish (likely *Asteria rubens*) or due to dislodgement by storms (Steenbergen *et al.*, 2005; Calderwood *et al.*, 2016; Troost *et al.*, 2022; BIM, 2023; Chopin, 2024). Although, it is possible to assume that some of the smaller seed remained, it would be difficult to prove it without in depth DNA analysis.

Aquaculture Technical Section

Seafood Technology Services Business Unit

BIM

References:

BIM. 2023. Mussel Mortalities Survey Report – 26 and 27/10/2023.

<https://data.marine.ie/geonetwork/srv/eng/catalog.search#/metadata/ie.marine.data:dataset.4532>.

Calderwood, J., O'Connor, N. E., and Roberts, D. 2016. Efficiency of starfish mopping in reducing predation on cultivated benthic mussels (*Mytilus edulis* Linnaeus). *Aquaculture*, 452: 88–96. Elsevier B.V.
<http://dx.doi.org/10.1016/j.aquaculture.2015.10.024>.

Chopin, N. 2024. Temporal and Spatial Settlement of Subtidal Seed Mussels on the Southeast coast of Bangor University. 127 pp. [https://research.bangor.ac.uk/portal/en/theses/temporal-and-spatial-settlement-of-subtidal-seed-mussels-on-the-southeast-coast-of-ireland\(63c5e187-82ac-4a73-a9fc-efbe7d34328c\).html](https://research.bangor.ac.uk/portal/en/theses/temporal-and-spatial-settlement-of-subtidal-seed-mussels-on-the-southeast-coast-of-ireland(63c5e187-82ac-4a73-a9fc-efbe7d34328c).html).

Hervas, A., Tully, O., Hickey, J., Keeffe, E. O., and Kelly, E. 2008. Assessment, Monitoring and Management of the Dundalk Bay and Waterford Estuary Cockle (*Cerastoderma edule*) Fisheries in 2007. 38 pp.

Steenbergen, J., Baars, J. M. D. D., Stralen, M. R. Van, and Craeymeersch, J. A. 2005. Winter survival of mussel beds in the intertidal part of the Dutch Wadden Sea. Monitoring and Assessment in the Wadden Sea. Proceedings from the 11. Scientific Wadden Sea Symposium, NERI Techn: 107–112.



Troost, K., van der Meer, J., and van Stralen, M. 2022. The longevity of subtidal mussel beds in the Dutch Wadden Sea. *Journal of Sea Research*, 181: 102174. Elsevier B.V.
<https://doi.org/10.1016/j.seares.2022.102174>.



Có-mhaoinithe ag an
Aontas Eorpach
Co-funded by the
European Union



Rialtas na hÉireann
Government of Ireland

Bord Iascaigh Mhara
Irish Sea Fisheries Board