Seed Mussel Survey Tonnage Estimation Report for the Blackwater Area – 10/08/2021

Equipment: 0.1 m^2 Day Grab

Area surveyed: Seed mussel settlement previously found along the shore near Blackwater (see Preliminary Seed Mussel Survey Report for Southeast Coast – May/June 2021 at www.bim.ie)

Survey summary:

Scattered patches were found during the preliminary survey in May (BIM, n.d.). During a second acoustic survey of the area in July, four distinctive patches were found (Fig.1). At the time, the seed mussel appeared to be scattered on the seabed and no clear seed mussel patterns (van Overmeeren et al., 2009) were observed on the acoustic data. The coordinates generated from the side scan sonar data report have been reported as the following:

Table 1: Area coordinates (in Degrees, decimal minutes WGS84)

- *Main patch (15 hectares):*

Latitude	Longitude
52° 26.378' N	6° 15.471' W
52° 26.071' N	6° 15.548' W
52° 26.064' N	6° 16.050' W
52° 26.217' N	6° 16.009' W

- *Scattered patches:*

Latitude	Longitude
52° 26.625' N	6° 17.193' W
52° 26.624' N	6° 16.857' W
52° 25.921' N	6° 16.898' W
52° 25.915' N	6° 17.113' W

NOTE: Those coordinates only indicate corners of a simplified polygon (in yellow in fig.1) in which the seed mussel settlement is located.

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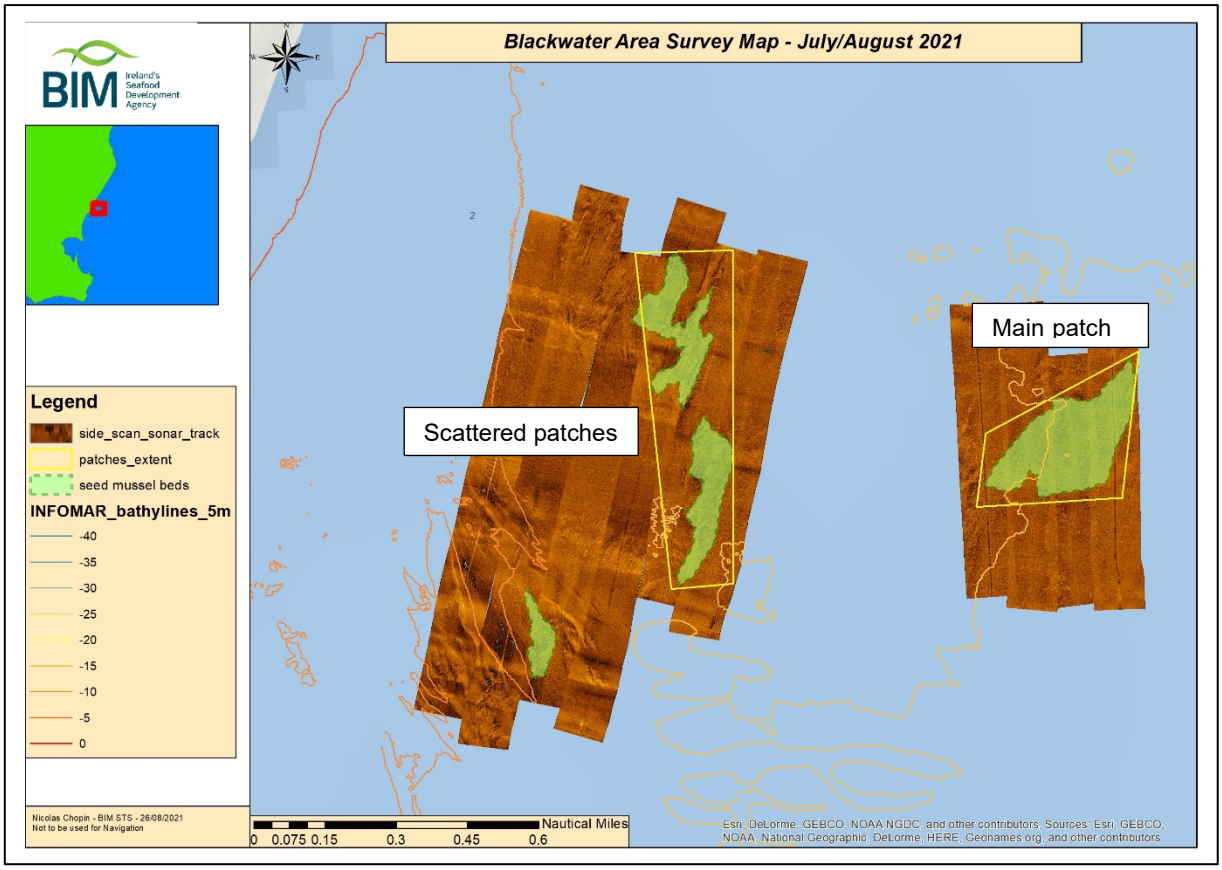

Fig.1: Seed mussel patches at Blackwater

However, because of the relatively small sizes of the patches, it was decided to focus the biomass survey on the larger patch (15 hectares) in the area. It is also possible that further patches are around the location, however they were not mapped.

A first, twenty seven samples were collected during the Alien Invasive Species survey on July 27th and a further twenty eight samples were collected on August 19th to complete the biomass estimation. On the **55 samples**, 1 was taken outside the established boundaries of the possible settlement, therefore it was not integrated in the biomass calculation. The grab sampling confirmed that the seed was very scattered at the location: only 19 grabs showed various amount of seed while 36 only showed a mix of sand and shells (Fig.2).

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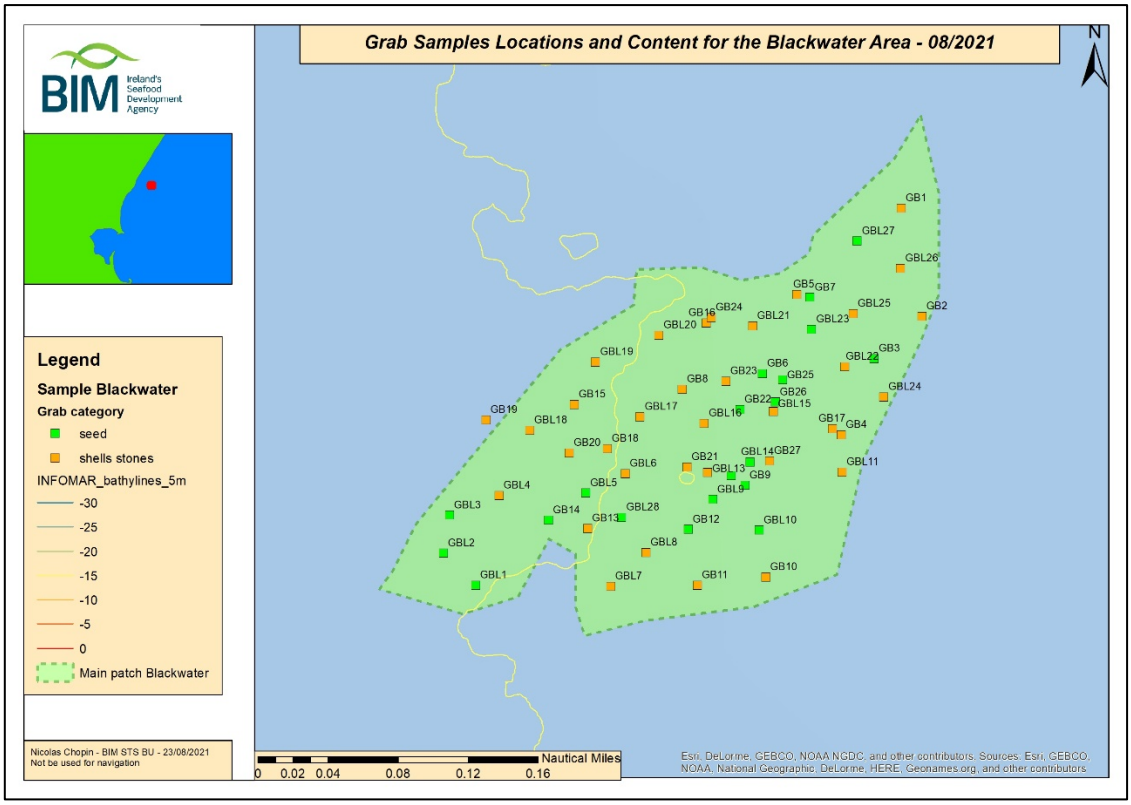

Fig.2: Grabs locations and content

As per previous biomass surveys in 2021, the grab samples presented a wide density range from 40 g of seed to 1,092 g per 0.1 m^{-2}, averaging just above **446 g per 0.1 m^{-2}**. The higher densities were observed at the centre of the patch, following a southwest to northeast direction (Fig.3). The average depth at the location is 16 meters.

The amount of waste per sample was averaging 36% of the weight of each grab (minimum: 13%, maximum: 85%). The waste was mainly composed of coarse shelly sand, gravel, and stones. Although grab sampling also collects the substrate on which the seed has settled, the level of waste for this particular area were rather low in comparison with other similar surveys.

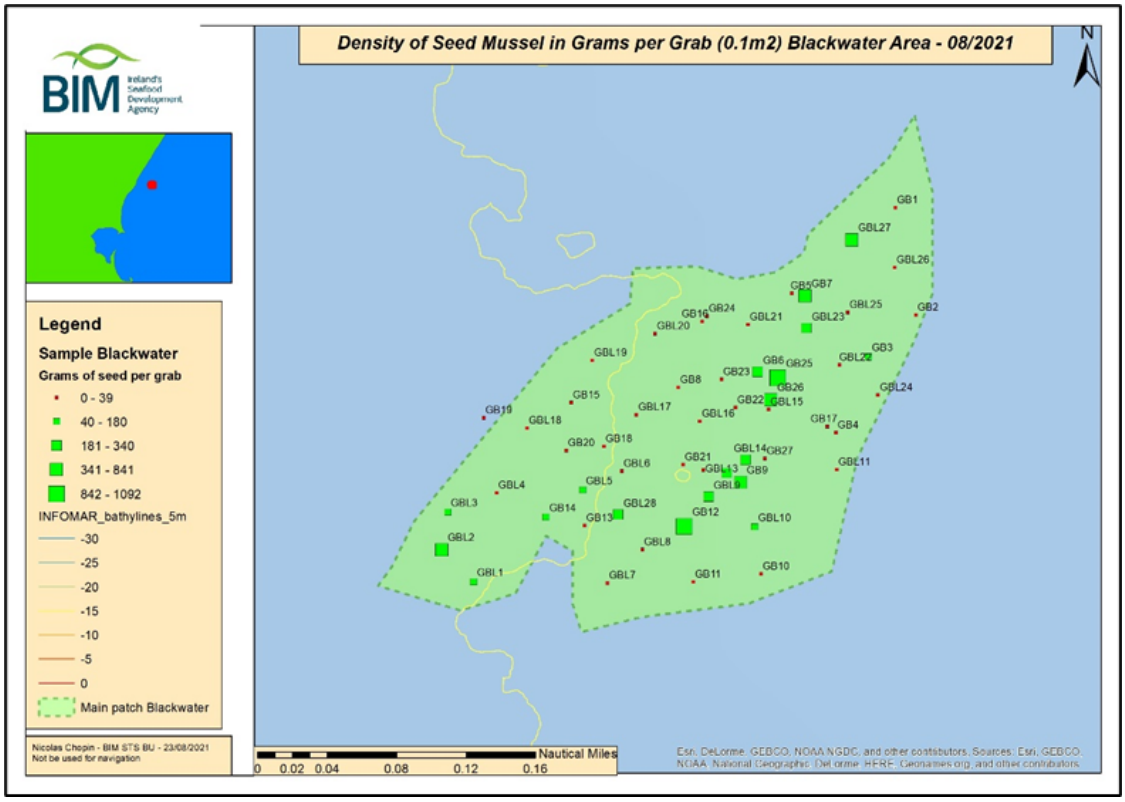

Fig.3: Seed mussel densities per grabs

Biomass estimation:

The data collected was interpolated using the IDW (Inverse Distance Weighting) tool in ArcGIS, which was previously used to assess biomass on cockle beds (Hervas, Tully, Hickey, Keeffe, & Kelly, 2008) as well as seed mussel beds in 2020 (BIM, Chopin, & McCoy, 2020).

Based on the weight of seed collected in each grab, 11 density classes were defined and used to classify the interpolated grid within the bed boundaries. The extent of each class was then calculated in hectares and the biomass was generated by multiplying the mean weight by the area for each class (table 2). The generated map highlights the higher densities of seed diagonally at the centre of the patch (in yellow and red on the map), and although low quantities were observed in the grabs in the generated green areas, the Alien Invasive Species dredge survey reported a better coverage on the seabed (Fig.4). It appears that the scattering of the seed mussel on the seabed limited the efficiency for the samples collection with the grab.

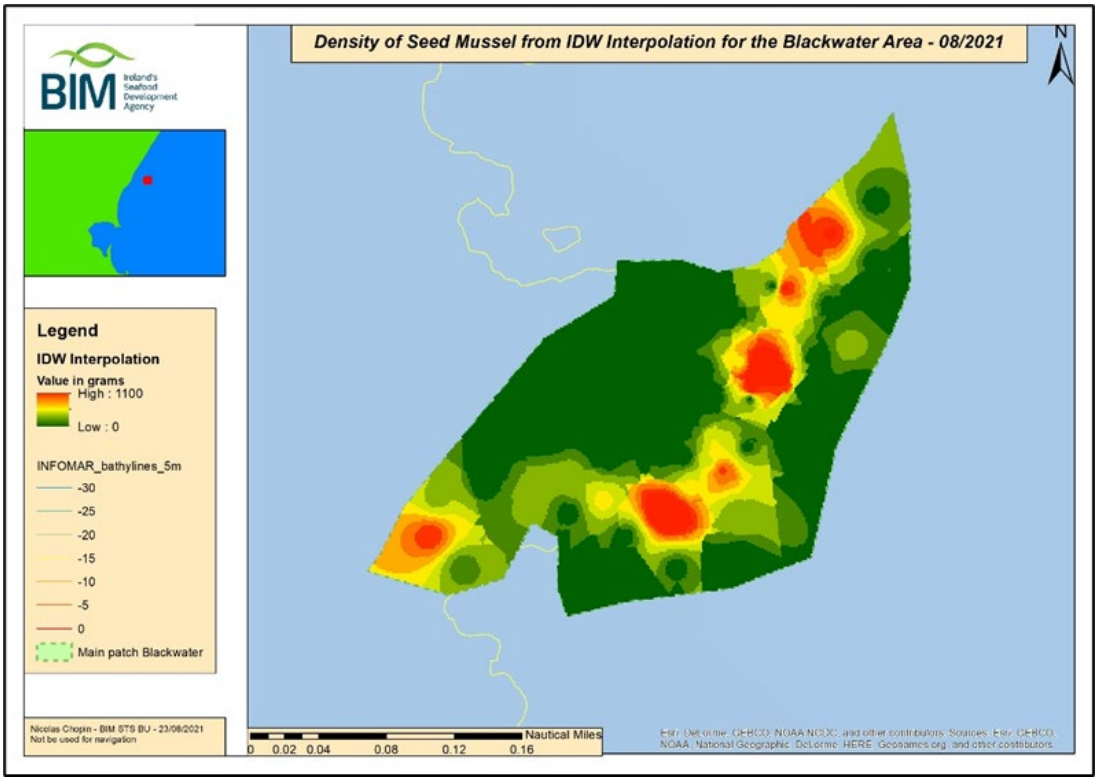

Fig.4: IDW generated density map

Density Classes	Areas in hectares	N samples	Mean Wt per 0.1 m^{-2} in Kg	Tonnes/Area
0 to 40g	7.58	35	0.00	0.00
40g to 100g	2.11	1	0.04	8.43
100g to 200g	2.21	5	0.15	32.94
200g to 300g	0.99	2	0.29	28.63
300g to 400g	0.82	4	0.33	26.82
400g to 500g	0.65	0	0.00	0.00
500g to 600g	0.49	0	0.00	0.00
600g to 700g	0.37	2	0.66	24.27
700g to 800g	0.15	1	0.73	11.11
800g to 900g	0.08	1	0.84	7.12
900g to 1100g	0.13	2	1.05	13.65
Total area	*15.57*		*Total tonnage*	*152.97*

Table 2: IDW biomass interpolations

At the time of this survey, the potential seed mussel biomass in main patch at Blackwater was estimated to be **152.97 metric tonnes**.

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Biometrics:

Two samples were kept for shell length measurement. For each sample, 100 individuals were measured as well as another 100 mussels taken from pooling all the other samples. Considering low water temperature in the spring, **GBL2** displayed good seed mussel size for this time of year, with an average size of **33.53 mm** (range: 15.15 mm minimum, 41.52 mm maximum). This was also the case for the **sample pool,** showing an average size of **30.48 mm** (range: 11.01 mm minimum, 41.06 mm maximum). When looking across the population size distribution and previous observations earlier in the year, it is possible to hypothesise that this seed could have settled late in 2020 as the 30 mm to 36 mm classes represented 49% of the measured individual (fig.5).

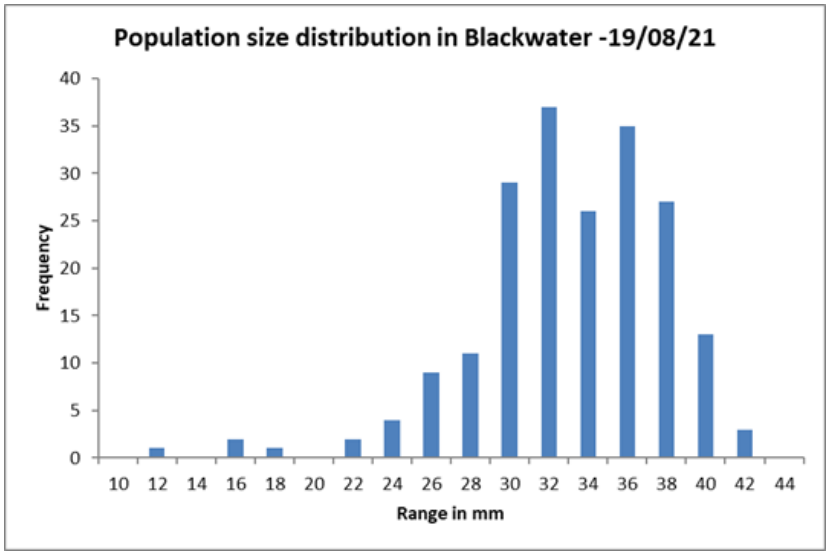

Fig.5: Population distribution histogram

The current population does not seem to be under predation pressure as only a limited as little to no mortality was observed during the alien invasive species survey carried out the previous week.

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Summary/recommendations:

The 2021 Blackwater settlement is mainly **composed of likely late settled mussel from 2020 averaging 34 mm** in length. There is no large bed in the area but rather patches of various sizes and densities similar the 2013 settlement at the same location. The larger patch represents approximately **15 hectares** and following biomass estimation calculations, could yield around **150 metric tonnes**. The **dominating size class** on this patch is comprised between **30 and 36 mm**, with an average size of **32 mm** (**minimum: 11.01 mm, maximum: 41.52 mm**). There is no apparent predation pressure on the settlement. It is likely that other patches with similar seed could be available in the vicinity, however they have not been quantified during the present survey. Also because of the nature of the seed distribution on the seabed, the available biomass could possibly be underestimated.

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Fig.6: Processed seed sample from the main patch at Blackwater

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References

BIM. (n.d.). Seed Mussel Survey Reports. Retrieved December 18, 2019, from http://www.bim.ie/our-publications/aquaculture/

BIM, Chopin, N., & McCoy, G. (2020). *Seed Mussel Bed Post Fishery Survey 2020 Seed Mussel Bed Post Fishery Survey 2020*.

Hervas, A., Tully, O., Hickey, J., Keeffe, E. O., & Kelly, E. (2008). *Assessment, Monitoring and Management of the Dundalk Bay and Waterford Estuary Cockle (*Cerastoderma edule*) Fisheries in 2007*. *Fisheries Resource Series* (Vol. 7).

van Overmeeren, R., Craeymeersch, J., van Dalfsen, J., Fey, F., van Heteren, S., & Meesters, E. (2009). Acoustic habitat and shellfish mapping and monitoring in shallow coastal water - Sidescan sonar experiences in The Netherlands. *Estuarine, Coastal and Shelf Science*, *85*(3), 437–448. https://doi.org/10.1016/j.ecss.2009.07.016

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