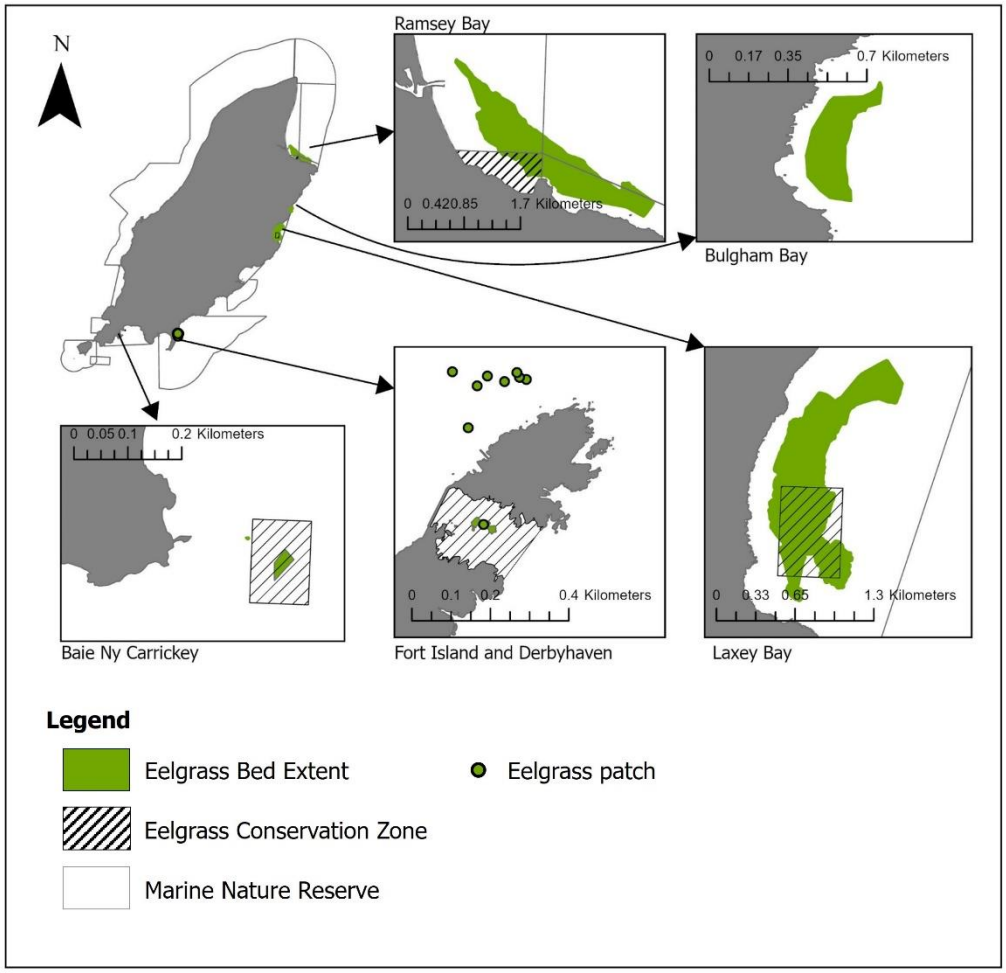
Consultation Supplementary Document - Overview of Project Results to Date: Eelgrass and Saltmarsh

Eelgrass



Extent & Condition

- Eelgrass habitats on the Island consist of both large meadows, such as those in Ramsey (65–125 ha) and Laxey Bay (39–61 ha) (accounting for 95% of the total habitat), and smaller patches, including Fort Island (0.1 ha), Derbyhaven (0.01 ha), Bay ny Carrickey (0.003 ha), and Bulgham Bay (10 ha), encompassing between 114 – 196 hectares, depending on the confidence levels applied in the analysis (Muir *et al.,* thesis in preparation).
- An assessment of photos, drop-down (DD) video camera surveys, and a review of Seasearch/Manx Wildlife Trust reports found that the seagrass meadows in Ramsey Bay and Laxey Bay are located in deeper waters compared to other sites. These meadows have patchy to medium canopy cover, with denser areas near Ramsey Pier. The seagrass leaves ranged from 10–30 cm in length and showed brown marks, which could suggest poorer meadow health (Muir et al., thesis in preparation).

- In contrast, the smaller seagrass meadows at Bulgham Bay, Fort Island, Derbyhaven, and Gansey Point were located in shallower waters and had denser coverage. At Fort Island, seagrass leaves grew up to 1 m, and Bulgham Bay displayed developing seeds along with increased biodiversity, both of which indicate better meadow health (Muir et al., thesis in preparation).

Carbon Storage Capacity

- The extent and carbon standing stock of the Island's eelgrass habitat were quantified using sediment cores and various habitat mapping techniques, including side-scan sonar (SSS), DD video cameras, dive and snorkel surveys,
- The Isle of Man's seagrass meadows were found to have low carbon density, ranging from 1.1 to 1.7 MgC ha^{-1}, with an average of 1.3 MgC ha^{-1} within the top 10 cm (Muir *et al.,* thesis in preparation). This results in a conservatively estimated total carbon stock of 125 MgC, based on average carbon density and maximum eelgrass area (Muir et al., manuscript in preparation). Compared to other studies across the British Isles and Europe, the Isle of Man's carbon density values are notably low. Carbon accumulation could not be determined due to mixed sediments.
- The low carbon stocks may be attributed to the island's large tidal ranges, limited organic input, and coarse sediments.
- Nonetheless, the areas of Ramsey Bay eelgrass bed sampled were found to store 43% more OC in the top 10 cm than nearby unvegetated sediments, demonstrating their enhanced carbon storage (Muir *et al*., thesis in preparation).
- It is important to note that these findings are based on data from one location in Ramsey Bay. Expanding data collection to include other seagrass beds around the Isle of Man would provide a more comprehensive understanding of their carbon storage potential.

Biodiversity and other Key Ecosystem Services

- A master's student conducted a biodiversity assessment on the epifauna present on seagrass blades from two sites around the island. The results compared favourably with other UK locations, showing slightly above-average species abundance and richness (Manning, Thesis in preparation). Nitrogen and carbon levels were also assessed; and analysis is ongoing.
- A desk-based assessment determined key ecosystem services provided by eelgrass meadows include biodiversity, fisheries and nursery provision, nutrient cycling and water quality, coastal protection, and tourism and recreation.

Current Protection Levels

- Currently only around 39% of eelgrass meadows are inside Eelgrass Conservation Zones, including approx. 9% of Ramsey Bay seagrass meadow, approx. 40% of Laxey Bay seagrass meadow, and 100% of Fort Island Gully seagrass meadow. All other meadows (Bulgham Bay, Derbyhaven, and Gansey Point) are currently situated outside of Eelgrass Conservation Zones.

Potential for expansion/restoration

- A habitat suitability modelling exercise conducted during the project identified additional areas where *Zostera marina* could potentially grow. While the model predicted substantial areas, it did not account for seabed substratum, meaning

further investigation is required to validate these sites as suitable for seagrass. These areas could nonetheless serve as promising locations for exploring unmapped existing beds.

- Given the low carbon density observed in the analysed seagrass beds, further research would be necessary to determine whether creating new seagrass beds would be both viable and valuable from a blue carbon perspective.

See appendix 1 for supplementary information regarding methods used to determine extents and associated confidence levels with the data.

Saltmarsh

Extent and condition

- Saltmarsh is relatively rare on the Isle of Man, covering a total of 7.38 hectares, or 0.01% of the Island's terrestrial area (Phase 1 ref). The habitat is primarily found in three larger sites: Poyll Dooey and Ramsey Harbour (2.6 ha) along the Sulby River in the north, Cornaa (0.7 ha) in the east, and Langness (2.7 ha) in the south. Additionally, there are a range of smaller pockets of saltmarsh, including areas at Pooil Vaaish (1.1 ha), Santon Gorge (0.004 ha), Fort Island (0.1 ha), and Derbyhaven (0.06 ha).

Carbon storage and accumulation capacity

- Sediment cores were collected and analysed from the Poyll Dooey and Cornaa saltmarshes to determine the amount of carbon stored within the habitat and accumulated on an annual basis.

- Saltmarshes have the highest carbon density of any blue carbon habitat on the island (averaging 23 Mg C ha^{-1} in the top 10 cm on sediment - Muir *et al.,* Manuscript in preparation), although they cover a limited area, which restricts their overall contribution to the island's blue carbon stock.

Biodiversity and Other Key Ecosystem Services

- An invertebrate assessment was conducted to quantify biodiversity contribution of Manx saltmarshes – results are expected Spring 2025.

- Key ecosystem services include coastal and flood protection, biodiversity, blue carbon, tourism and recreation.

Current Protection Levels

- Saltmarshes in the Isle of Man are not designated as protected habitats, although certain plant species found within them are protected under the Wildlife Act 1990.
- The saltmarshes at Langness, St Michael's Isle, and Pooil Vaaish are afforded land-based protection as designated features within Areas of Special Scientific Interest (ASSIs). Other saltmarsh areas are not within protected zones.

Opportunities for Expansion/Restoration

- Opportunities for expanding saltmarsh habitat are constrained by topography, making significant additional carbon storage unlikely. Efforts should therefore focus on the protection and effective management of existing saltmarsh areas.

- Although the potential for active restoration and expansion of the Isle of Man's saltmarshes is thought to be limited, there is still the possibility of encouraging and allowing their natural growth.
- A survey was conducted at Cornaa Estuary to assess saltwater intrusion within the estuary, with results indicating that the estuary becomes almost entirely marine during high water spring tides. While the saltmarsh is currently restricted to the southern part of the estuary, it is possible that it extended further northwards in the past. Changes in management practices may have led to the saltmarsh reverting to a more terrestrial environment. However, further surveys would be required to confirm this.

Appendix 1 - Supporting information regarding methods and confidence levels used to determine extent estimates: from Muir et al., thesis in preparation,

Ramsey

Seagrass meadows were mapped and their extents estimated in ArcGIS Pro software from side scan sonar (SSS) surveys and seagrass presence and absence datasets obtained by TV camera surveys (Barrule, 2021), DD video camera (Manx Blue Carbon Project, 2023), and diver surveys (Manx Wildlife Trust, 2021 and 2024). Polygons were corroborated with Thiessen polygons (methods above). Confidence is highest in the centre of the meadow to the west of the headland Gob ny Rona, where point datasets from TV surveys, DD video, and diver surveys are abundant along the length of the meadow. Confidence is lower on the east of the headland and along the periphery of the meadow, where presence data are sparser.

Laxey

Seagrass meadows were mapped and their extents estimated in ArcGIS Pro software, based on SSS surveys (2023) and seagrass presence and absence datasets obtained by TV camera surveys (Barrule, 2022) and DD video camera (Manx Blue Carbon Project, 2023).Confidence in identifying seagrass presence based on SSS images is highest in the centre of Laxey Bay, where there is overlap with TV surveys and DD survey points. Confidence is lower in regions where the reflectance pattern on the SSS images is comparable with seagrass but where these have not been mapped using TV or DD surveys. The seagrass meadow density varied, DD video survey in Laxey Bay found that seagrass cover was patchy and sparse to medium on sandy mud to muddy sand, with occasional seaweed present

Bulgham

Seagrass meadows were mapped and their extents estimated in ArcGIS Pro software using Thiessen polygons (methods above), based on seagrass presence and absence datasets obtained by TV camera surveys (Barrule, 2021), DD video camera (Manx Blue Carbon Project, 2023), and diver surveys (Manx Wildlife Trust, 2021 and 2024). Confidence in

identifying seagrass presence based on Thiessen polygons is highest in the south of Bulgham Bay, as a diver survey (2024) mapped the outer extent of a seagrass meadow, which was corroborated by diver transects (2021). Confidence is medium in the north of Bulgham Bay, where a diver survey (2024) corroborated the results of a TV survey (2021). Confidence is low elsewhere in Bulgham Bay, where absence data were generated based on water depth only. The seagrass meadow density varied from low to medium, DD video and diver surveys in Bulgham Bay found that seagrass cover was patchy and varied between sparse and dense on sandy substrate with rocky outcrops. The seagrass meadow appeared to be healthy, with reports of developing seeds on some leaves and increased biodiversity in the seagrass meadow with various species including snakelocks anemones, hermit crabs, a John Dory, and fish fry.

Derbyhaven and Fort Island Gully

Seagrass meadows were mapped by Manx Wildlife Trust and Seasearch diver surveys (2022) and their extents estimated in ArcGIS Pro software (Figure). Confidence is high based on these diver surveys which provided high-resolution estimates of seagrass meadow peripheries. Dive records also recorded 2–3 smaller patches of approx. 10 m^2 north of the Fort Island jetty, and a small patch at the end of the jetty of approx. 0.6 m^2, The seagrass meadows were healthy with leaves up to 1 m in length, forming dense and sparse regions and interspersed with boulders on mixed ground (cobbles, pebbles, sand and gravel) in Fort Island Gully.

Bay ny Carrickey

Seagrass meadows were mapped by Manx Wildlife Trust diver surveys (2024) and their extents estimated in ArcGIS Pro software (Figure). Confidence is high based on the diver surveys which provided high-resolution estimates of seagrass meadow periphery. However, other patches of seagrass are suspected based on historic records, therefore overall confidence in seagrass meadow extent at Gansey Point is low. The seagrass meadows were healthy, forming sparse patches interspersed by kelp on mixed ground (cobbles, pebbles, sand and gravel).