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PROJECT SEAGRASS

WWF

Seagrass Ocean Rescue

Solent

seagrass
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Foreword

The SOR Solent project provides a compelling example of how effective collaboration between scientists, practitioners, stakeholders, and local communities can be integrated to deliver evidence-led successful seagrass restoration and conservation outcomes. The project demonstrates the value of cross-sector partnership in achieving coordinated delivery while establishing a legacy within the Solent and Isle of Wight region—an achievement that merits recognition.

The project has played a pivotal role in establishing a foundation for seagrass restoration and conservation across the Solent and Isle of Wight, acting as a catalyst for habitat recovery, protection, and increased investment. It has stimulated engagement, awareness and action among environmental and conservation organisations, helping to attract further funding and opportunities for Project Seagrass in addition to natural habitat recovery in general. Building on the success of SOR Solent, Project Seagrass, in collaboration with Swansea University, has expanded seagrass restoration efforts across the region through initiatives such as the Solent Seascape Project (SSP), funded by the Endangered Landscapes and Seascapes Programme and East Head Impact. Additional projects include Seagrass Advancement Solent, funded by Seacology; Accelerate Seagrass, supported by Deloitte and Climate Impact Partners; and other related initiatives. This expanded activity on seagrass restoration would not have been possible without the support of the SOR Solent project.

The scientific outcomes of the project's seagrass planting methodologies are particularly encouraging, demonstrating promising approaches for seagrass restoration and identifying techniques associated with higher success rates than previously applied methods. These methods and approaches are now actively being applied across the Solent region (and elsewhere in the UK) in seagrass restoration projects. The findings of this restoration experiment will be submitted for publication in an open-access, peer-reviewed journal, with the aim of sharing results, lessons learned, and improved planting techniques. This research will provide valuable evidence to inform the scientific community, support future seagrass restoration projects, and guide community-led initiatives in best practice restoration methods.

Project Seagrass extends its sincere thanks to the project funders and partners for their invaluable support throughout the duration of the project, in particular WWF, Liz Earle, Carlsberg and Sky. Appreciation is also extended to landowners and regulatory authorities for their cooperation at a time when seagrass restoration and seascape-scale recovery initiatives in the region were still in their early stages. Their engagement has helped to establish pathways for future projects. Finally, we acknowledge the local community and stakeholders for their enthusiastic participation and ongoing stewardship.

Anouska Mendzil
Senior Science Officer | Swansea University and Project Seagrass

Executive Summary

The Seagrass Ocean Rescue (SOR) Solent project, funded by WWF in partnership with Project Seagrass, Swansea University, and Liz Earle, successfully delivered 100% of its workplan objectives between December 2022 and December 2025. This pioneering initiative aimed to design large-scale seagrass restoration, conduct rigorous methodological trials, and foster community engagement across the Solent and Isle of Wight.

Over half a million seeds (633,470) and 3000 plants were collected as part of the multi-year WWF funded SOR Solent programme. At the scientific core of the project tested six seagrass planting methodologies across three Solent sites, Thorness, Priory Bay, and Beaulieu, planting over 293,000 seeds and 864 transplants across 0.5 ha area with a restoration area covering 2.7 ha. Results showed that bare-root transplants were the most effective method, yielding a 312% increase in shoot counts at Thorness, which proved to be the most viable restoration site, while Beaulieu was deemed the least suitable (with no growth observed). Dispenser Injector Seeding (DIS) also performed strongly for seed-based methods.

Beyond ecological milestones, the project successfully integrated the local community, engaging an estimated 9,298 individuals and 491 volunteers through various events, talks, and the innovative "Fragment Walk" initiative, which empowered locals to replant storm-uprooted seagrass. Ultimately, SOR Solent leaves a profound legacy, catalysing and contributing to future seascape-scale habitat recovery, driving passive restoration via Advanced Mooring Systems (AMS), and advancing global marine science.

Key achievements include:

- **Seagrass Restoration Trials:**
    - Over half a million seeds (633,470) and 3000 plants were collected as part of the SOR Solent project.
    - Development of a robust scientific planting methodology trial across three Solent sites (Beaulieu, Priory Bay, Thorness) using local donor meadow (*Zostera marina*) seeds and transplants.
    - The restoration planting area in this study equated to 27,150 m^2 or 2.715 ha in total across the three sites.
    - Tested six planting techniques at a scale of 5,400 m^2 or 0.5 ha with 293,400 seeds and 864 transplants.
    - Conducted 10 monitoring campaigns plus 10 additional field surveys, producing high-resolution data on survival, growth, and restoration efficacy.
    - Transplants were found to be the most successful method, achieving a 312% increase in shoot counts at Thorness; Dispenser Injector Seeding (DIS) also performed well.
    - Thorness was found to be the best overall site for seagrass planting in this study, with Beaulieu being the least suitable.
    - Shoot length was found to be highest at Thorness in the transplant method.

- Observed more seagrass patches at our sites than previously present and cautiously assume (but cannot be definitive) many, if not all, arise from our project intervention.

- **Additional Scientific Contribution:**
    - Improved knowledge as to the extent, ecological role and status of seagrass in the IoW and wider Solent region. UAV and Blueboat surveys mapped seagrass presence where data were previously lacking.
    - Established the first assessment of seagrass reproductive effort by seagrass from the UK, assisting decision making on seagrass restoration licensing.
    - Passive restoration measures included installation of two Advanced Mooring Systems (AMS) in high recreational boating areas.
    - Supported the inclusion of sites in the IoW and Solent region in wider UK and European studies on seagrass, with data and publications emerging (seagrass-associated biodiversity, fisheries and population genetics).
    - Early results were presented at the ESRA2 conference (France, 2025), with peer-reviewed publication and further dissemination planned in 2026.
- **Community Engagement and Education:**
    - Engaged 491 volunteers through 22 sessions, delivered 25 talks, attended 61 community events, and maintained active social media communications.
    - Ran four training programs, one Seagrass Symposium, four public signage installations, and distributed bi-annual newsletters.
    - Supported schools with lessons and educational packs integrating seagrass into the curriculum.
    - Developed the "Fragment Walk" community restoration initiative, completing 14 events, planting 498 fragments, and demonstrating survival increases up to 211%. This has now been rolled out as a method in other locations and is expected to become a defined method (with a guidance document) as a result.
- **Stakeholder Collaboration:**
    - Maintained strong relationships with regulatory authorities, partners and diverse stakeholders, landowners, and 11 seagrass reference working groups.

Impact and Legacy

SOR Solent has established a precedent for seagrass restoration in the Solent and Isle of Wight, providing a catalyst for large-scale habitat recovery and informed conservation practices. It has also undertaken one of the largest experimental seagrass restoration programmes in the UK. The project exemplifies excellence in combining scientific research, stakeholder collaboration, and community engagement, ensuring sustainable seagrass restoration and ongoing regional awareness. The project has paved the way for active as well as passive restoration of *Zostera marina* within these areas and seascape-scale restoration to aid marine habitat recovery.

The results of this project will be published in a peer-review journal, and a Solent focused-workshop will be held with regulatory authorities and WWF following publication to communicate the results wider.

Project Development

This report was produced as the end of project report for The Seagrass Ocean Resue (SOR) Solent funded by WWF UK. The project began in December 2022, securing a year no-cost extension for 2025, taking the end project date to December 2025.

Effective Implementation of Workplans and Budgets

The SOR Solent has achieved 100% delivery of the workplan. In advancing seagrass science and knowledge exchange the results of the research will be published in a peer-review journal. Furthermore, the results will be presented in conferences following the publication. The results will be presented and communicated to Natural England in a workshop session with invited regulatory authorities and project partners as required.

Any changes to the workplan or budget during the duration of the project will have been documented into previous technical and/or annual reports.

Challenges and Opportunities Affecting Delivery

One of the main challenges for SOR Solent identified early in the project was site selection. Existing seagrass meadows were found to be extensive on the Isle of Wight despite early Habitat Suitability Monitoring (HSM) indicating medium to high suitability for seagrass restoration in some sites (Figure 2). Pre-selected sites based on this HSM were found to be unsuitable due to existing seagrass meadows observed during substantial on-site pre-planting and reconnaissance surveys (Figure 1), new site areas were identified and a new focus for the SOR Solent was formed.

The SOR Solent identified two key research questions, this would be required as a first step before active and large-scale restoration could take place in the Solent and Isle of Wight. These research questions are:

- Can seagrass, in this case *Zostera marina*, be restored and re-established in the intertidal zone in the Solent?
- By which method is *Zostera marina* germination, growth and resilience optimised in the Solent?

A scientific experiment was designed and implemented to answer these questions.

Initial challenges at the beginning of the project were: obtaining regulatory licenses (planting and collecting of seeds and plants) due to seahorse protection status, particularly as seagrass restoration was in its infancy in the UK in general, but specifically the Solent area, which led to some time delays and a knock-back on the original timeframe.

Some unexpected and unforeseen, localised environmental issues at Priory Bay likely affecting seagrass growth and survival is the amount of physical disturbance affecting the bay. At this location there were notable terrestrial landslides during winter 2024 and spring 25 and continued anchoring and mooring disturbance and pressure from recreational boat users. Additionally, mechanical dredging of the nearby Bembridge navigational channel is also likely to contribute to the volume and re-distribution of sediment in the water column affecting the seagrass planted area at Priory Bay. This physical seabed disturbance will impact seed and plant growth by restricting light availability through suspended sediment and increased sediment accretion, whilst also making the sediment more mobile and susceptible to re-suspension, reducing the ability of seed roots to establish. Project Seagrass secured funding from The Crown Estate, the seabed regulators in this vicinity, at the end of 2025 to address some of the physical disturbance and reduce the pressure to the meadow and site by installing a number of Advanced Mooring Systems (AMS) as visitor moorings or seabed habitat markers for recreational boaters, a form of passive restoration. This is scheduled for installation in early 2027. As a result, restoration at Priory Bay is reduced to protect the area in the first instance. The natural seagrass meadow in the inshore at Priory Bay simultaneously diminished during the period between 2023 and 2025, following what was believed to be the abrupt high volume clay input from the landslide adjacent to the natural meadow in addition to the anchoring and mooring pressure. The remains of the natural meadow were observed in an organic-rich anoxic layer below the sediment surface indicative of decomposing seagrass rhizomes. To manage this loss, a community restoration initiative was developed by Project Seagrass to plant live washed-up seagrass fragments found on the beach into this designated site where seagrass had been lost.

The SOR experimental plots were positioned and planted in close proximity and adjacent to this natural seagrass meadow, which was in a healthy state at the time of planting, for a number of reasons, such as, the protection function of what an already established meadow can provide, the existence of a natural meadow suggesting existing suitable environmental conditions, and lower topographical elevation causing pooling of water in a small lagoon referred to locally as 'Caribbean Corner'. We believe that the loss of this naturally existing *Zostera marina* meadow, through sediment infilling and higher elevation, could have been one of the largest contributors to the loss of seagrass from our planted experimental plots.

A new challenge emerges in mapping and demonstrating the subtidal growth of the seagrass at both sites but notably at Thorness, which has seen the largest growth and expansion. Calculating and monitoring the area of seagrass growth is key in highlighting this project as a success but also the suitability of the methods tested. UAV flights would be the preferred and easily accessible option for mapping seagrass areas, but water clarity remains an issue for obtaining subtidal meadow extent. Future projects may look to test the efficacy of side scan sonar, particularly from remotely operated surface vehicles (blue boats, as trialled in this project), in accurately and efficiently monitoring large areas of seagrass restoration.

Adaptive Management

This project highlighted the need to trial seagrass transplantation as part of the experimental design and methodologies due to a range of scenarios; however Natural England remain largely opposed to this. The 'Fragment Walk' a community restoration concept has been a direct response to test the effectiveness of these transplants uprooted by storms and anthropogenic activities, from local natural meadows, whilst undertaking community engagement and guardianship.

These local uprooted seagrass fragments can be collected in a largely healthy state leading to potentially high survival (they would otherwise desiccate and degrade on the shore). This initiative was crudely tested in the Isle of Wight ahead of official public opportunities beginning in January

2024. We have, as a result, been able to confirm with Natural England that the collection and planting of these fragments (without depositing materials onto the seabed) is permitted if landowner permission is granted (collection and planting sites) and will not be disturbing any protected feature or species. Transportation of fragments can occur within an SAC (or MPA) due to the transport risks of invasive species. We propose to trial this method further into Thorness, where our transplants as part of SOR Solent are showing substantial survival and growth.

Additional adaptive management at the beginning of the project, surrounding initial concerns regarding the high prevalence of *Sargassum* at certain sites, meant that more detailed site assessments needed to be carried out. Some initial sites selected for the experiment were assessed and deemed unsuitable for this reason amongst other environmental factors.

Upon reflection of our restoration site at Beaulieu, it was found that seagrass may be unlikely to survive or succeed in its present intertidal location. As a result of this concern, we were able to undertake an additional secondary planting campaign, repeating the same experiment in July 2023, further into the shallow subtidal zone, as a rapid response to the failing seedlings, using seeds that were surplus from the March planting.

From early 2024 monitoring at Beaulieu, we were able to see no growth of seeds or survival of transplants. This lack of success likely stems from high sediment transport making the seabed unstable. As an adaptive management approach to this we were able to undertake a recce of the existing meadow at Lepe during 2024, near our planted location at Beaulieu. We were able to ascertain that the Lepe meadow looked healthy and dense and any potential efforts to increase restoration of the existing meadow in the intertidal would-be promising at this location. We therefore proposed that any opportunity to increase the existing seagrass meadow at Lepe would be viable providing further funding was secured and relevant landowner and regulatory authority permissions would be sought. The meadow is routinely surveyed by Natural England, but a full survey would be required to begin restoration work at this location. This aspect of the work would be unachievable during the timeline, duration and budget of the current SOR project and would require further funding.

Seagrass Demonstration Project Preparatory Work

Aim 1 | Work together with regulatory bodies and key stakeholders to design and implement a major seagrass restoration project

Understanding seagrass meadow reproduction in the Solent for seed collection

In June 2021, Swansea University and Project Seagrass worked in collaboration with Natural England, Ocean Conservation Trust and the Hampshire and Isle of Wight Wildlife Trust (HIWWT) to perform 12 seagrass meadow surveys within 8 seagrass meadows around the Solent. The seagrass meadows surveyed included, Beaulieu (two locations), Bembridge, Boldnor West, and Bouldnor East, Cowes, Osborne Bay (two locations), Ryde, Totland and Yarmouth (two locations). Site selection was based on prior knowledge of seagrass meadow presence with the aim of understanding which meadow to source seeds from. The metrics measured as part of the meadow surveys included, seagrass cover (%), shoot density, reproductive effort (%), algae cover (%) and maximum leaf length (mm). *Zostera marina* was found in all locations however Ryde was the only site where *Z. noltii* was additionally observed.

Seagrass meadows around the Solent had an average cover of 45.66% ± 28.72. Yarmouth 1 had the highest cover (69.40% ±26.43), whilst Totland had the lowest (12.80% ±17.84) (Table 1). Totland had significantly lower cover than all other sites ($P<0.001$).

Higher seagrass cover did reflect a statistically significant gradual increase in reproductive effort ($P<0.001$), however the R^2 value was low (0.07). The average shoot density per 0.25 m^2 in the Solent was 45.38 ± 30.79. This reflected the seagrass percent cover, with Yarmouth 1 showing the highest density (85.64 ± 39.65 %), whilst Totland showed the lowest percentage cover (19.64 ± 21.31 %). The proportion of reproductive shoots (showing flowers or seeds) averaged 7.47% ± 10.28 across all sites. Bembridge had the highest reproductive output (16.18% ± 10.75), whilst Beaulieu had the lowest (2.21% ± 4.98). HIWWT estimated 698 hectares of seagrass meadows around the Isle of Wight from surveys conducted between 2006- 2014 (Figure 1) (Watson *et al.* 2020).

Collection of 1,000,000 seeds for local restoration efforts would equate to 0.098% of the island's seeds. This figure is based on Totlands' meadow metrics with the lowest observed reproductive effort and underestimates the number of seeds per reproductive shoot, the density of reproductive shoots and the extent of Solent seagrass meadows. Averaging the estimates across all the Solent sites equates to the collection of 0.019% of seeds. Taking an average across all the surveyed sites, using the conservative 57 seeds per reproductive shoot and the underestimate of 698 hectares of seagrass meadows around the Isle of Wight, then the collection of 1 million seeds equates to 0.019% of seeds. This ensures negligible negative implications on donor meadow health and resilience, or on animals within the meadows.

Table 1. The average percent cover of seagrass, shoot density, percentage of shoots that are reproductive and percent cover of macrophytes with ± standard deviation, per survey site around the Solent in June 2021. The 'healthiest' site for each metric is highlighted in green, the worst in red.

Site	Seagrass cover (%)	Shoot density per $1m^2$	Reproductive effort (%)	Algae cover (%)	Max leaf length (mm)
Beaulieu 1	38.64 ± 16.14	161.60 ± 70.17	10.32 ± 14.39	13.64 ± 9.54	623.81 ± 89.02
Beaulieu 2	40.40 ± 12.49	150.88 ± 58.24	2.21 ± 4.98	16.20 ± 8.20	527.08 ± 134.92
Bembridge	56.20 ± 32.68	161.44 ± 86.92	16.18 ± 10.75	13.52 ± 13.44	390.23 ± 93.70
Bouldnor East	48.96 ± 34.07	165.60 ± 69.12	9.21 ± 14.33	14.60 ± 20.17	411.06 ± 90.74
Bouldnor West	58.60 ± 29.76	195.68 ± 138.79	10.11 ± 11.65	25.32 ± 23.77	522.22 ± 146.64
Cowes	26.18 ± 32.70	59.24 ± 82.23	14.62 ± 19.95	4.17 ± 7.49	702.22 ± 215.34
Osborne 1	54.48 ± 26.31	260.16 ± 131.10	3.57 ± 6.06	17.40 ± 14.58	574.55 ± 113.17
Osborne 2	55.00 ± 21.26	249.60 ± 88.36	6.24 ± 5.76	17.80 ± 9.14	536.40 ± 109.15
Ryde	32.48 ± 19.50	134.24 ± 129.07	10.79 ± 7.04	10.08 ± 11.02	394.33 ± 77.13
Totland	12.80 ± 17.84	78.56 ± 85.25	3.27 ± 5.34	18.32 ± 19.97	512.55 ± 213.50
Yarmouth 1	48.40 ± 22.35	229.44 ± 105.01	3.66 ± 6.11	48.32 ± 34.59	466.67 ± 134.25
Yarmouth 2 (Harbour)	69.40 ± 26.43	342.56 ± 158.62	4.28 ± 5.71	26.20 ± 20.98	696.52 ± 131.07

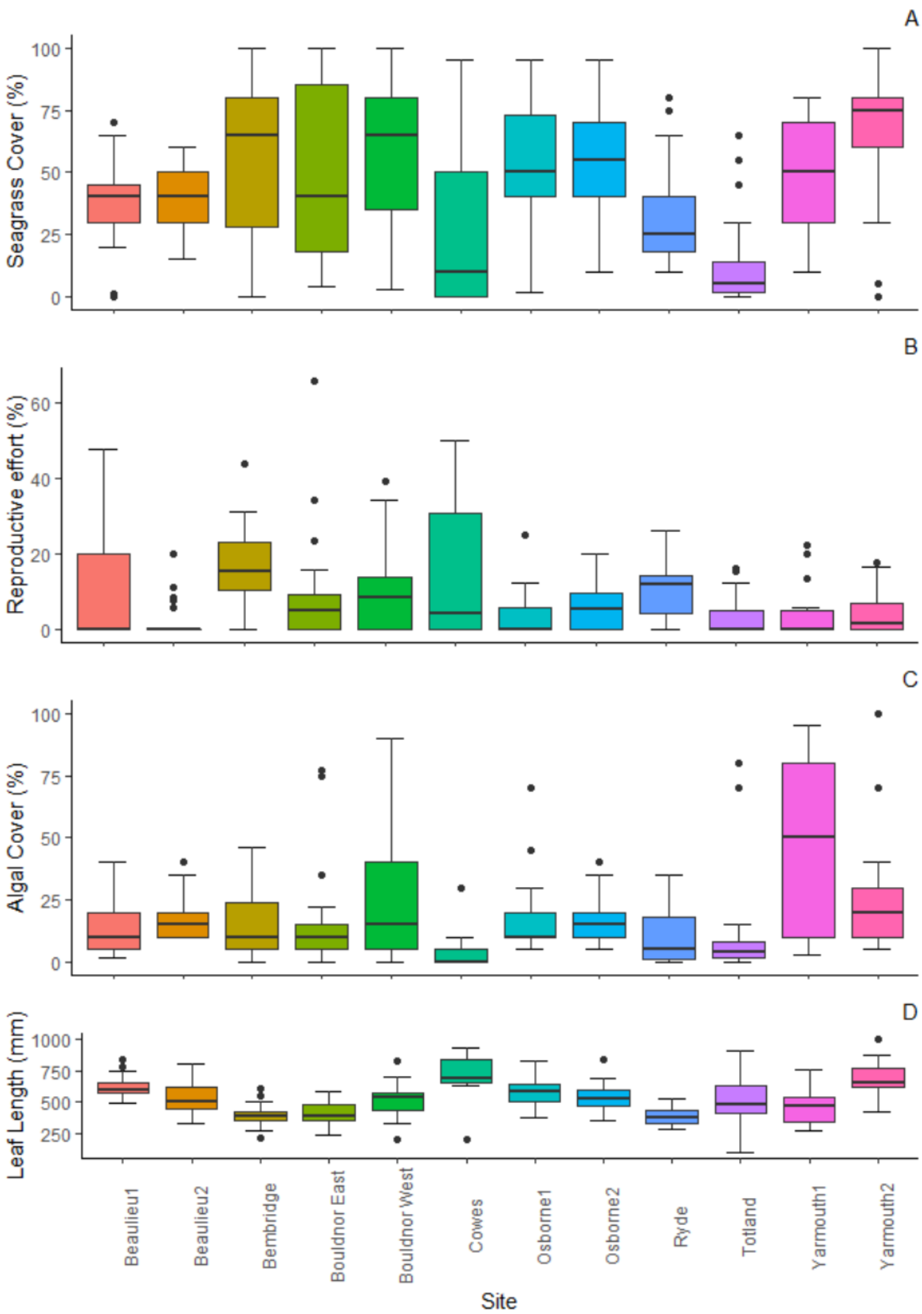

Figure 1. Boxplots of seagrass surveys around the Solent in June 2021. This includes percentage cover of seagrass (A), percentage of shoots with reproductive spathes (flowers and seeds) (B), percentage cover of macrophytes (C) and the maximum leaf length (D).

Understanding mapped seagrass in the Solent

As part of a desktop assessment of the currently mapped extent of seagrass meadows in the Solent and Isle of Wight, multiple open-source data platforms were reviewed, including the Natural England National Seagrass Layer hosted on the digitised Magic Map platform (Figure 2). This assessment identified notable discrepancies between predicted seagrass absence and field survey evidence, indicating seagrass meadow presence at certain locations, such as Seaview. These findings highlight the need for a national-level review of seagrass distribution across the British Isles, as existing datasets may be outdated. Mapping data generated through the present project will be shared with Natural England to support updates to the National Seagrass Layer where appropriate, ultimately this will enhance seagrass knowledge and presence in the area and identify gaps for future research.

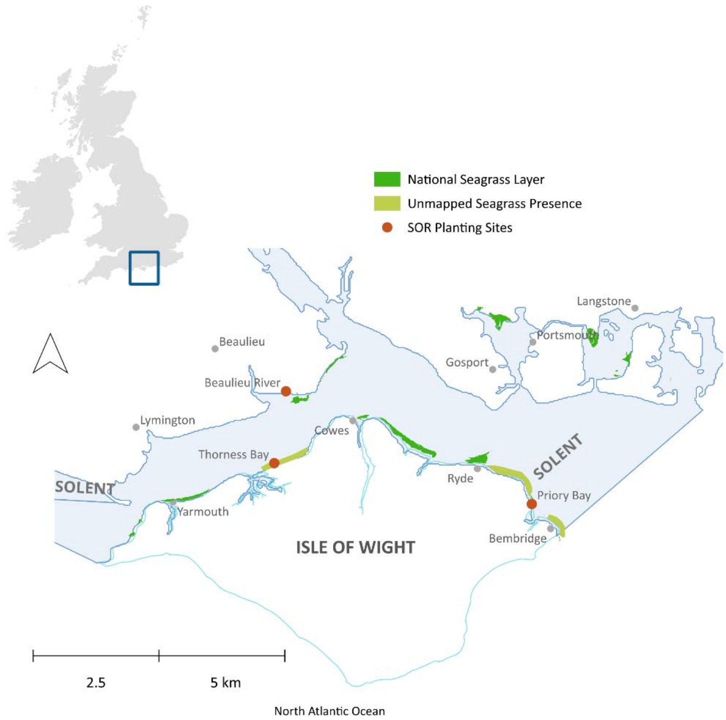

Figure 2. Solent and Isle of Wight Magic Map mapped seagrass meadows and known unmapped seagrass meadows on the Isle of Wight.

To improve mapping efforts, Ocean Infinity in collaboration with Project Seagrass conducted multibeam and side scan surveys, to map the seabed in the North Isle of Wight region, repeatedly finding seagrass to be more extensive than the HIWWT surveys (Ocean Infinity, *Unpub*.). Using the conservative cover of 698 ha, the seed abundance around the island would range between 1,022,067,328 (lowest seed density observed at Totland) to 10,392,497,877 seeds (highest seed density observed at Bembridge). Results of this exercise informed the pre-planting seagrass surveys as part of SOR Solent (Figure 3).

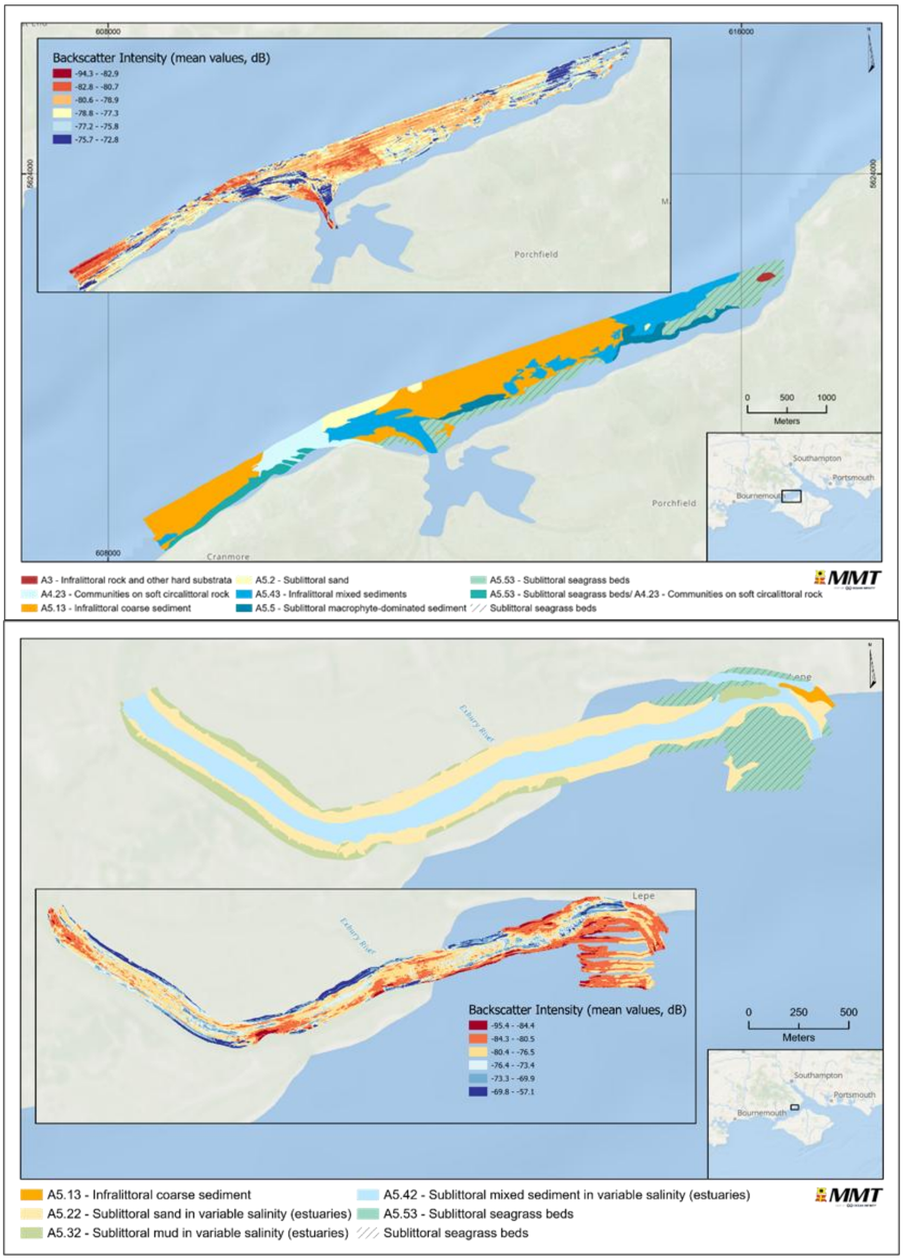

Figure 3. Seabed characterisation maps based on Backscatter intensity at Thorness (top) and Beaulieu (bottom).

Furthermore, in collaboration with Swansea University and Project Seagrass under the NERC-funded Restoration for Seagrass for Ocean Wealth (ReSOW) Project, Habitat Suitability Mapping (HSM) was undertaken for the Solent region. The HSM outputs indicated that Seaview (see Figure 4) was the most suitable for seagrass restoration.

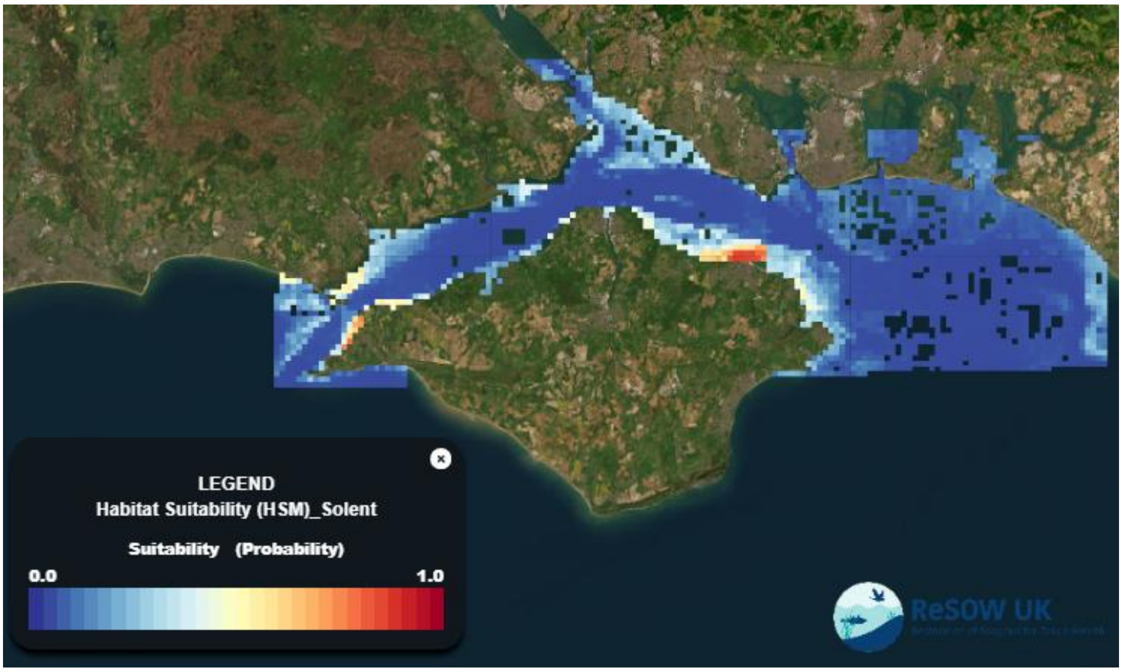

Figure 4. Habitat Suitability Mapping for the Solent and Isle of Wight.

To obtain high-resolution spatial mapping and imagery of each site, Unmanned Aerial Vehicle (UAV) surveys were conducted in 2021, 2022, and 2025 using a Wingtra fixed-wing UAV equipped with RGB and multispectral sensors. These surveys will be expanded into an annual monitoring programme for the duration of Project Seagrass's involvement at the sites, providing long-term temporal evidence of seagrass spatial extent and growth (Figure 5).

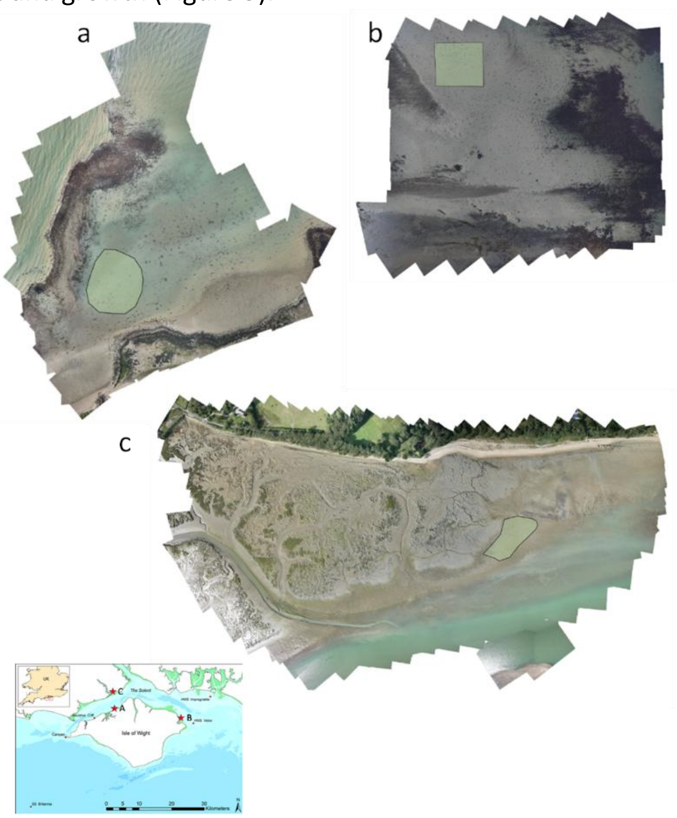

Figure 5. Proposed trial restoration sites (with inset map) at Thorness (a), St Helens (b) and Lepe/Beaulieu (c). 0.5 ha suitable areas are shown, these have been assessed using on the ground and boat-based surveys in 2021 and 22. Aerial imagery was collected in Oct 2021 and April 2022 using a Wingtra drone.

Understanding the health of seagrass in Solent meadows

Given the sensitivity of seagrasses to environmental change, and the factors thought to be negatively influencing the health of the surface waters of the Solent region, here we provide an assessment of the condition of the region's seagrass meadows. Through quantifying a multivariate signature of eelgrass (*Zostera marina*) across 16 sites in the Solent and Isle of Wight areas, we aimed to determine a key indicator of how seagrass health is affected by water quality-nutrients. We found that a suite of biochemical parameters of seagrass tissues sampled from the different sites were correlated with the multivariate signature created by quantifying meadow and plant characteristics (and *vice versa*). However, none of the recorded parameters were, alone or in combination, able to adequately explain the whole ecosystem state, suggesting that drivers of the seagrass ecosystem are more complex than a series of basic indicators.

We also found large spatial variation in the health and resilience of the meadows we assessed. Some of the seagrass in the Solent and Isle of Wight areas was in a healthy and potentially resilient state. However, in many locations, seagrass health was found to be generally compromised by indicators of eutrophication, particularly within the harbours, with signs of light limitation, stress, and low resilience. Although seagrass may cover large areas within the harbours, the meadows may be close to tipping points with respect to their environmental health, making populations potentially unstable. Water quality is clearly a major influence upon seagrass in the region, and we recorded consistently high nitrogen and phosphorus values, indicating that most meadows were subject to some level of catchment runoff that has the potential to influence seagrass. In some locations this runoff is close to compromising the future of the seagrass.

Our water quality report, together with existing literature and local knowledge finds that seagrass sites in the harbours (Portsmouth, Langstone, Chichester, Lymington) were likely to be highly eutrophic and not be functioning as resilient meadows suitable for further restoration activity irrespective of whether site of no seagrass may exist. Sites outside of the harbours within the Solent and the Isle of Wight are generally much more likely to be effective long-term sites for seagrass restoration due to lower nutrient levels and higher light environments. Seagrasses at Cowes and Calshot were the exception here as they also showed signs of compromised condition, with low seagrass cover and density, low light availability and high nutrient content (P) (Figure 6). Our surveys did find some seagrass 'Bright Spots', these were at Studland, Bouldnor, and Bembridge, where the seagrass can be considered relatively healthy. At Studland, Bouldnor, and Bembridge, seagrass cover, density and canopy height were high (Figures 6 and 7). At Studland, all three metrics were higher than the national (UK & Ireland) average (see Jones *et al*., 2016). The seagrass at Totland was an outlier as its nutrient environment is not enriched however its density is low, we speculate that the seagrass at this site is close to a physical environmental threshold like some sites assessed in North Wales (Bertelli *et al*., 2021).

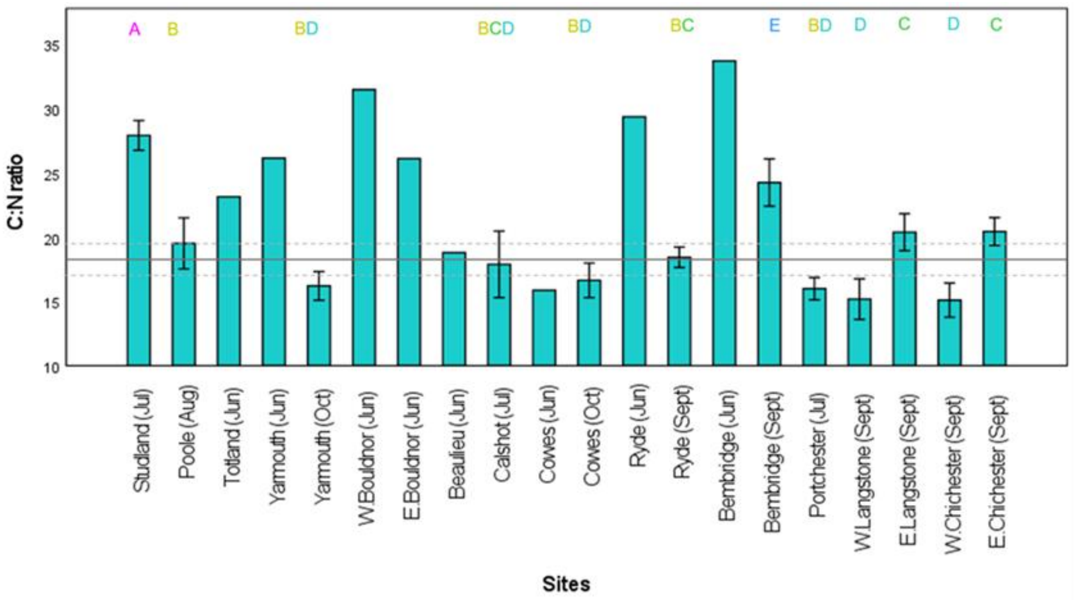

Figure 6. Seagrass meadows were assessed at 20 sites around the Isle of Wight and the Solent for their tissue nutrients (CNP, N15 and C13). The C:N ratio provides a broad indicator of light availability, sites in the harbours and some estuary mouths were subject to likely light limitation.

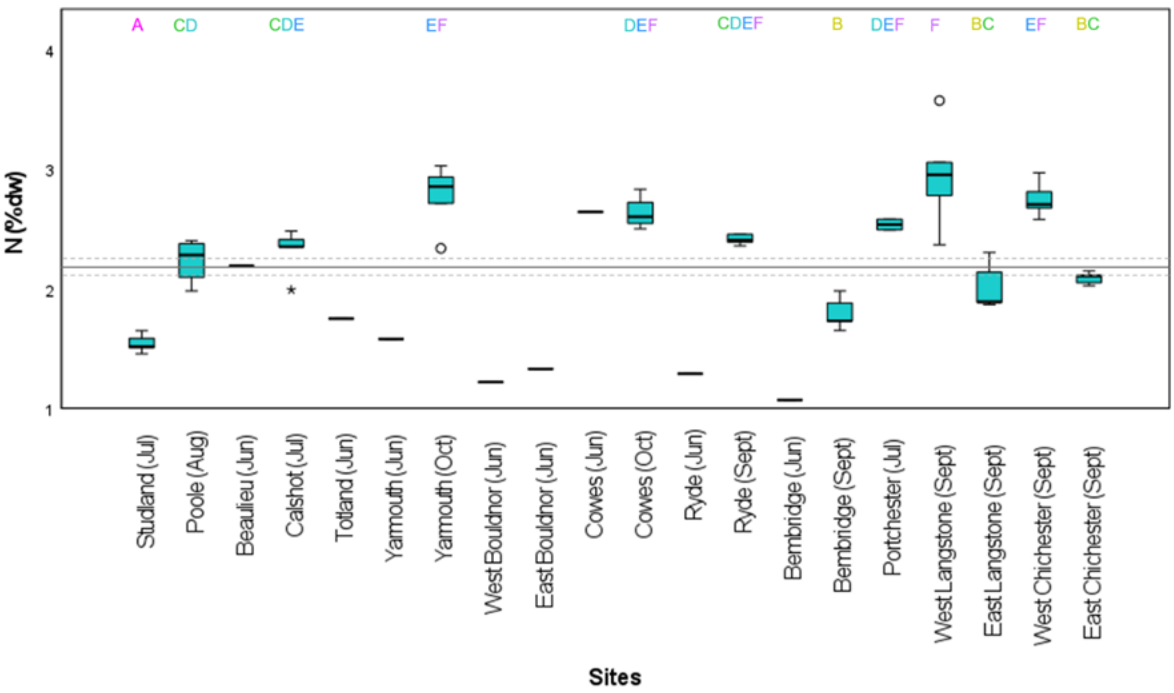

Figure 7. Total N (% dw) recorded at 16 sites in the south of England (Table 1, Figure 1). Boxplots indicate the median (bold line), interquartile range (box), minimum/maximum (whiskers), outliers (open circles) and extreme outliers (stars). Mean value and standard errors are reported in Table 3. Letters indicate homogeneous subsets according to SNK pairwise comparisons of the means ($p < 0.01$). The overall mean is plotted (solid line) along with 95% confidence intervals (dashed lines).

Understanding biodiversity in Solent seagrass meadows

In collaboration with Swansea University's NERC-funded RESOW project and Project Seagrass, seine netting surveys were conducted at selected seagrass meadows on the Isle of Wight (Figure 8), specifically at Seaview, Yarmouth, and Bouldnor. These surveys were undertaken to characterise fish assemblages associated with seagrass habitats and whilst this project isn't directly associated with the SOR Solent project its project partners are the same with the joint outcome to improve understanding of the supporting and functional ecosystem services provided by seagrass meadows which we can draw upon as part of SOR Solent.

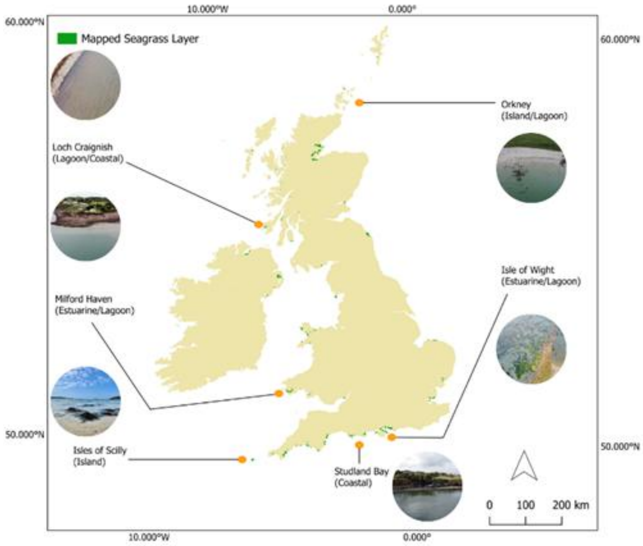

Figure 8. Fish sampling locations around the UK as part of the SRI research.

The results indicate higher fish abundance within seagrass meadows compared to adjacent non-vegetated habitats around the Isle of Wight. Of the fifteen species recorded, five were identified as commercially important, including pollock (*Pollachius pollachius*), Atlantic cod (*Gadus morhua*), and European seabass (*Dicentrarchus labrax*) (Figure 9).

These data contributed to the development of the first UK-wide, standardised framework for valuing the contribution of seagrass (*Zostera marina*) habitats to commercial and recreational fisheries, through application of a Seagrass Residency Index (SRI) (Mendzil & Unsworth, in prep.).

In addition to these studies on seagrass-associated fisheries, the SOR Solent project was able to support the efforts of a project to quantify seagrass-associated epifaunal biodiversity around the UK and determine any environmental drivers of these communities. This resulted in sampling of two sites around the coast of the Ise of Wight alongside 14 other UK sites. The study recorded additional nitrogen as a major determinant of lower abundance and diversity of these communities, providing some of the first UK-wide evidence of the potential food web impacts of elevated nitrogen.

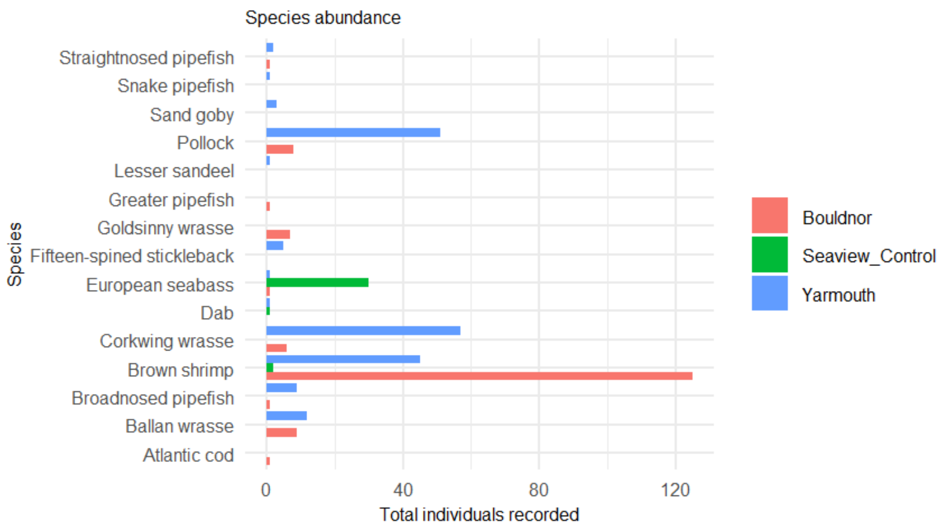

Figure 9. Fish species abundance across seagrass meadows on the Isle of Wight and at a non-seagrass control site, contributing to UK-wide Seagrass Residency Index (SRI) research (Mendzil & Unsworth, in prep.).

Site surveys and site decision matrix

During the scoping and site selection phase and following integration of existing datasets and information (Sections 1.1–1.4), pre-planting and ground-truthing surveys were conducted to identify the most suitable locations for in-situ experimental trials (Figure 10).

Baseline survey methods included drop-down camera assessments, Secchi disk measurements to evaluate water clarity, baited remote underwater video (BRUV) surveys, and habitat mapping using large-scale multibeam sonar. Survey points and transects encompassed areas of Thorness Bay, Seaview, Priory Bay, Bembridge, Yarmouth, and Totland, as illustrated in Figure 10.

Field-based scoping surveys revealed extensive *Zostera marina* meadows at Seaview that were not represented in available open-source datasets, including those underpinning Habitat Suitability Models (HSMs). Similarly, several additional locations around the Isle of Wight, identified by HSMs as having a high probability of seagrass presence, were confirmed in the field but were absent from existing spatial datasets. These findings indicate that a substantial proportion of seagrass meadows within the Solent and Isle of Wight remain unmapped, with significant implications for restoration planning, ecological research, and evidence-based policy development.

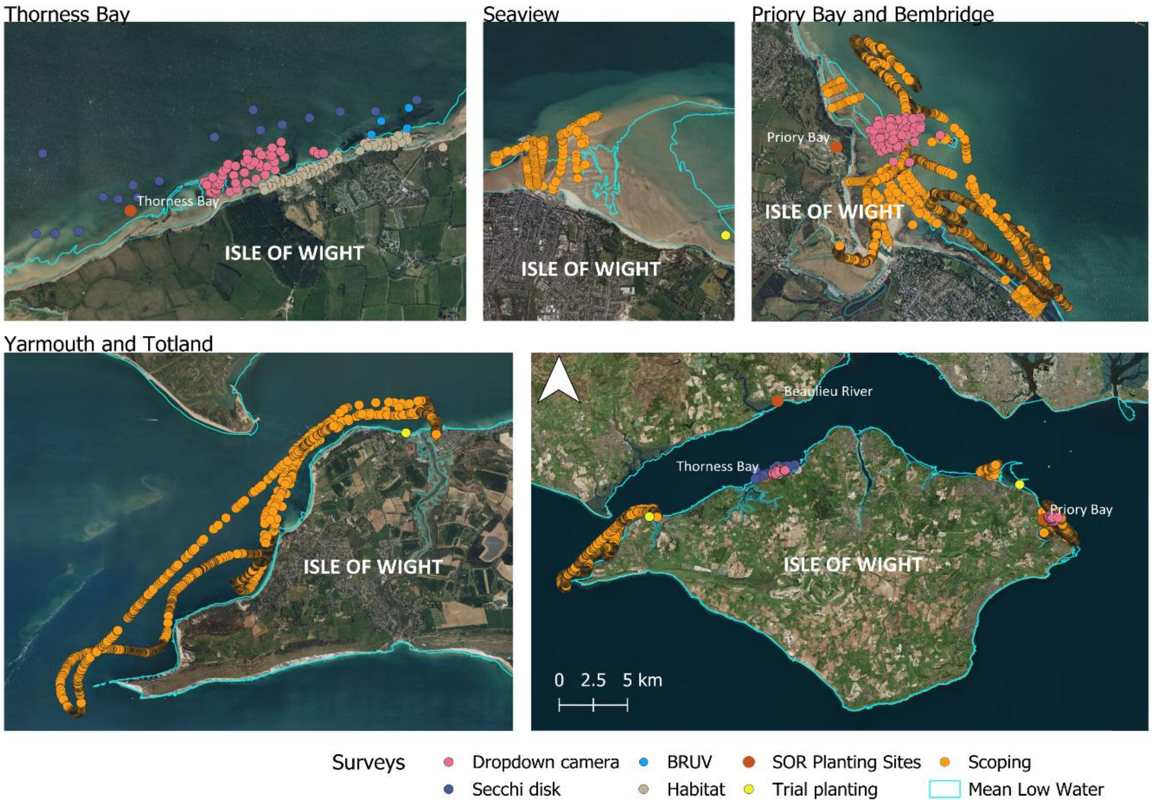

Figure 10. Baseline surveys in the Solent and Isle of Wight, 2021.

In addition, walkover foot surveys were undertaken during extreme low spring tides, using point and transect-based approaches, to ground-truth existing spatial mapping data at selected sites. The locations and survey methodologies employed prior to site selection are summarised in Table 2 and are also illustrated in Figure 10.

Table 2. Point and transect walkover ground truthing surveys

Locations	**Method**	**Summary**
Beaulieu	Sonar	Intertidal area mud banks and some seagrass subtidal
Beaulieu	Drone	Intertidal area mud banks and saltmarsh
Yarmouth to Hamstead	Foot surveys	Extensive seagrass
Hampstead ledges	Foot surveys	No Seagrass. Clay and hard substrate
Hampstead ledges	Drone	No Seagrass. Clay and hard substrate
Gurnard to Yarmouth	Sonar	Mostly seagrass, but no seagrass at Thorness/Burntwood
Osbourne Bay	Foot surveys	Continuous seagrass
Fishbourne to Ryde	Foot surveys	Seagrass broken up by bands of clay and hard substrate
Ryde to Seaview	Foot surveys	large areas of very high intertidal bare sand (suitable for *Z. noltii*), some areas extensive seagrass, subtidal seagrass extensive
Seaview to Bembridge	Foot surveys	Extensive boat moorings and anchoring, some seagrass and large potential bare sand areas, *Sargassum* abundant
Priory Bay/St Helens Fort	Boat	Large sand areas and extensive *sargassum*

Bembridge ledges	Boat and foot surveys	Patchy seagrass in bands mixed with *fucoids*
Totland	Boat and Sonar	Extensive seagrass

To synthesise the information generated through the present project, a decision matrix was developed to identify the most suitable sites for seagrass restoration. The matrix incorporated multiple criteria, including outputs from habitat suitability models, water quality metrics, spatial extent and condition of potential restoration areas, stakeholder considerations, identified stressors, and evidence of recent changes in seagrass distribution. Sites were scored against these criteria, with results presented in Table 3. Based on this assessment, Beaulieu, Bembridge, and Thorness were identified as the most suitable locations and were subsequently selected as the experimental sites for Aim 2.

Table 3. Decision matrix for Solent and Isle of Wight

Site	Water Quality	Stressor	Stakeholder concerns	Bare substrate available	Nearby Seagrass	TOTAL SCORE
Puckpool	3	1	1	1	1	7.0
Priory Bay	3	1	1	3	1	9.0
Seaview	3	1	2	2	1	9.0
Totland	3	1	2	3	1	10.0
Yarmouth	2	2	3	2	1	10.0
Bembridge	3	3	1	3	1	11.0
Beaulieu	2.3	2	3	3	1	11.3
Thorness	2.3	2	2	3	1	10.3

As an output of this work, all seagrass meadow mapping generated by Project Seagrass will be shared with regulatory authorities and key stakeholders, including Natural England, to support updates to open-access spatial products such as Magic Map's National Seagrass Layer.

These outputs represent an initial step in prioritising specific meadows for targeted Unmanned Aerial Vehicle (UAV) surveys, which were conducted in 2022 and 2025. The resulting high-resolution spatial datasets will subsequently be shared with Natural England and other relevant organisations, in alignment with Aim 1 of the project. Collectively, these activities, together with those described under Aim 2, contribute to the development of an evidence-based framework to inform and support seagrass restoration planning in the Solent and Isle of Wight.

Based on this assessment, Beaulieu, Bembridge, and Thorness were identified as the most suitable locations and were subsequently selected as the experimental sites for Aim 2.

Seagrass Ecological Work

Aim 2 | Undertake seagrass restoration methodological trials

The selected sites for the aligned experimental seagrass planting trials were identified from Aim 1 as Thorness and Priory Bay on the Isle of Wight, and Beaulieu on the North Solent mainland, as shown in Figure 11.

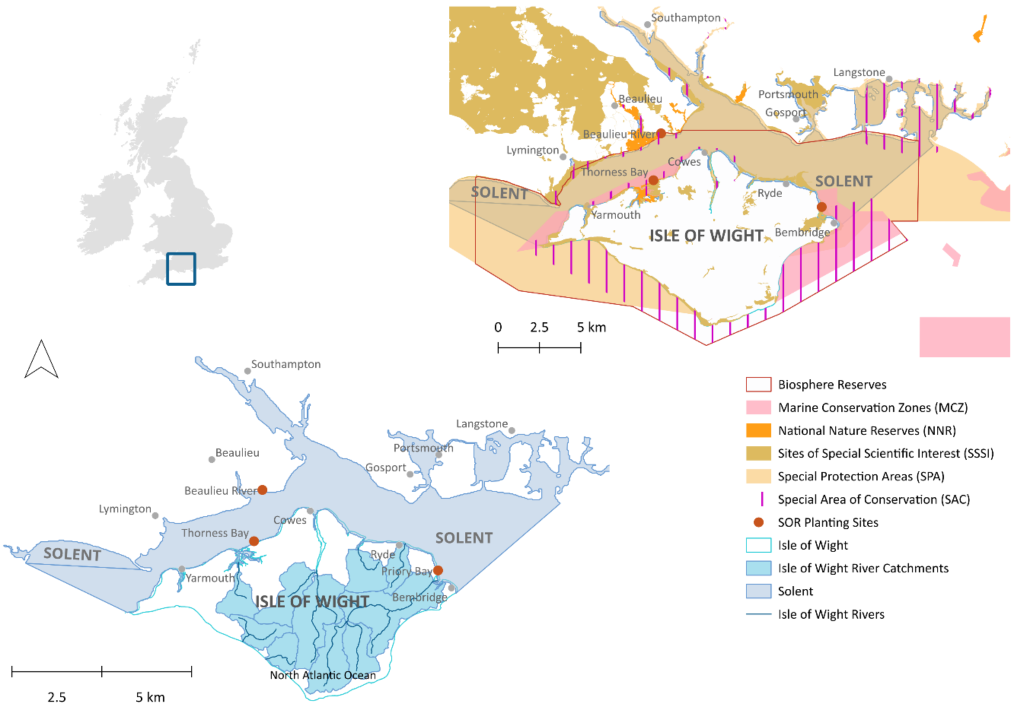

Figure 11. Solent and Isle of Wight designations (top) and SOR field sites.

Seed and transplant collection

To ensure an adequate seed supply for experimental planting across all three sites, a single donor seagrass meadow was selected at Osborne Bay. This location was selected based on licensing approvals granted by the Marine Management Organisation (MMO) and Natural England. Seed (Zostera marina) material was collected subtidally by SCUBA in July 2022 under license. Seagrass (Zostera marina) transplants were sourced subtidally at Weymouth Harbour by snorkellers, under licences issued by the MMO and Natural England and with permission from the relevant harbour authorities. A total of 311,400 Zostera marina seeds were collected in July 2022 and a total of 900 Zostera marina transplants were collected in May 2023 (Table 5). This aligns with objective 2.1 Collect sufficient healthy seagrass seeds and propagules in a sustainable manner to ensure planting success.

Preceding transplant collection at Weymouth Harbour on February the 7th 2023 Swansea University and Project Seagrass surveyed subtidal seagrass meadows, *Zostera marina*, at Weymouth Pier, Weymouth Bay, and Ringstead (Appendix II). A live feed drop down camera and a Biosonics MX echosounder were used. The survey aimed to establish seagrass meadow densities and coverage across the three areas (Figure 12). The timing of the survey meant seagrass densities (% cover) were at their lowest following the annual growth pattern of *Z. marina*. The most aerial coverage of seagrass was observed at Weymouth Pier with an extrapolated area of 0.52 ha averaging 43% seagrass cover but was highly variable. 25% cover of seagrass is typical of meadows in late winter following autumn and winter senescence, and evidence from seasonal trends at other localities indicates that cover will likely increase 2- or 3-fold during summer. The Weymouth Bay bed was sparse with a maximum of 3 shoots per patch. No seagrass was observed at Ringstead, which was dominated by shingle and macroalgae, although historic records here were shallower than the survey vessel was able to go. The survey observed a small seagrass meadow with patches going beyond the historic extent (Figure 12). Historic extent is based on summer surveys when the seagrass density and extent is at its highest. It is, therefore, likely that this meadow is expanding beyond what is shown in the present study once summer growth is considered.

When seagrass was observed (within the patches) it averaged 43.4 ± 27.6 % cover (Table 4). Collecting the full transplanting trial of 108 sods (4.32 m^2) from the area of > 70% seagrass cover at Weymouth Pier would result in the removal of 0.62 % of the densest area of the meadow. Areas with over 70% cover will increase as the growth season begins, reducing the impact of the collection. The sediment at Weymouth Pier was predominately sand with no macroalgae observed. There was insufficient water depth for an echosounder survey.

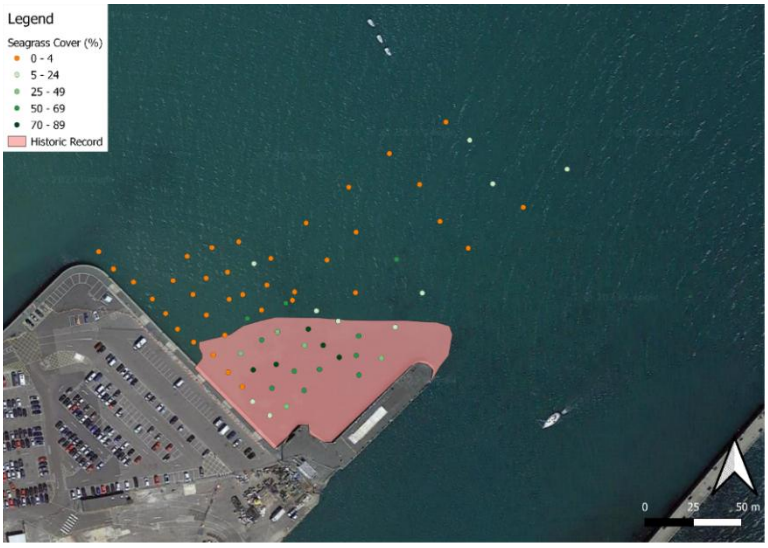

Figure 12. Weymouth Pier drop-down camera transects on 7th February 2023 with percentage cover of seagrass. Historic seagrass extent marked in pink.

Table 4. The seagrass meadow extent at Weymouth Pier in February 2023 based on percentage cover of seagrass, and the resulting percentage of the meadow that would be removed for the full transplanting trial.

Seagrass Cover (%)	Extent (ha)	% of bed removed for transplants
>25 %	0.52	0.08 %
>50 %	0.27	0.16 %
>70 %	0.07	0.62 %

Seagrass planting trials

Over half a million seeds (633,470) were collected as part of the WWF funded SOR Solent programme (Table 5) with current seed totals reaching 783,379 overall. Additionally, over 3000 plants were also collected and planted as part of the SOR Solent project. A total of 515,142 seeds has been planted over the multi-year project and planting continues to build resilience within these seagrass restoration sites.

For the seagrass planting methodology trials in 2023, 311,400 seeds were collected for the SOR Solent project and 900 bare-root local donor meadow transplants (Table 5). The experimental design allowed for a total of 293,000 seeds and 864 transplants to be planted across the three sites. Seed excess was retained by the Project Seagrass nursery for control studies and growing Solent-specific stock to support future restoration programmes.

Following seed collection, seed stock was transported to Project Seagrass headquarters in South Wales for processing over several months until the seeds were separated from their spaethes. Processed seeds were subsequently transferred to the Project Seagrass Nursery in West Wales for overwintering storage, under controlled environmental conditions, designed to prevent germination until their scheduled planting in March 2023 in accordance with the experimental design.

Seagrass bare-root transplants were immediately planted at the experiment sites directly following collection in May 2023 (Table 5). All seeds and plants as part of SOR Solent were planted in 2023. This aligns with objective 2.2 *and 2.3* of this project.

There are several reasons in differences between seed collection and seed planted totals, for example, in 2023/24 a white mould fungus had infected our seed stock during overwintering storage leading to significant seed loss. Appropriate aquaria adjustments and seed viability have been introduced to prevent this occurring again. In 2025/26 seed stock, the numbers have been increased, here we used seed stock from different seed populations to boost our seed supply for additional experimental designs.

Additionally, on average around 50 seeds per population are retained by the nursery for growing on into plants to bolster seed restoration projects for the Solent region in the future.

The WWF SOR Solent project has enabled additional seed collections in 2024 supporting the first planting year of the Solent Seascape Project (SSP) a multi-partner seascape project in the Solent, a project funded by The Endangered Landscapes and Seascape Project (ELSP) and East Head Impact managed by the Cambridge Conservation Initiative (CCI). The results from the SOR Solent project have significantly informed our large-scale restoration as part of SSP, here we commit at restoring Thorness and Priory Bay, building on the pivotal work developed as part of SOR. At these sites we continue to use DIS and transplants, the methodologies demonstrating preferential survival based on the SOR Solent project. As part of this SSP work, WWF continued to support seed collection, monitoring and seed storage whilst also providing key outreach and engagement through WWF sponsored events, media coverage and supporting ongoing community fragment walks. The SOR Solent project will continue to set a precedent for seagrass restoration and conservation in the region.

Table 5. Seagrass seeds and plants collected and planted by year, with cumulative totals. Entries highlighted in bold correspond directly to material associated with the SOR Solent project.

Year	Seeds collected	Seeds planted	Plants collected	Plants planted
2021/22	**-**	**-**	0	0
2022/23	**311,400**	**293,000**	0	0
2023/24	**190,070**	**101,710**	**900**	**864**
2024/25	**132,000**	**120,432**	**2,160**	**2,160**
2025/26	149,909	175,416	2,200	2,200
Total	783,379	690,558	5,260	5,224

Following stakeholder engagement and completion of licensing requirements with the MMO, Natural England, and The Crown Estate, an appropriate experimental design was developed, and specific planting locations were selected at the identified sites.

The spatial layout of planting plots at each site is presented in Figure 13, with the corresponding coordinates and detailed methodology for each planting area provided in Appendix I. A variety of seagrass planting techniques were assessed, including:
(i) **Bags** – hessian bags filled with sterile sand and *Zostera marina* seeds;
(ii) **Socks** – custom-designed large hessian sandbags containing play sand and *Z. marina* seeds;
(iii) **Dispenser Injection Seeding (DIS)** – a clay-based substrate composed of natural sediment collected from an existing seagrass meadow and seeded with *Z. marina*;
(iv) **Immediate replanting** – reproductive stems from local *Z. marina* plants placed in hessian bags with play sand; and
(v) **Bare-root transplants** – fixed with biodegradable anchoring peg, transplants were sourced under licence from Weymouth Harbour.

An additional exploratory (“wildcard”) treatment was implemented at Beaulieu due to remaining stock supply, involving the direct sowing of surplus spathes into the sediment without the use of hessian bags. A schematic overview of the planting methodologies is presented in Figure 14.

To build in scientific rigour to the experiment, three replicates of each method were plated at each of the three sites and additionally three controls were also assessed. Each of the methods were standardised with the same number of seeds or equivalent calculated for spathes for the immediate replanting method. In seed-based restoration methods a standardised seed density of 80 seeds per 1m^2 were planted equating to 8,000 seeds per 10 x 10 plots. A summary of the restoration treatment and quantity of seeds and plants planted at each is shown in Table 5 and 6. The total actual area planted across the three sites equated to 5,400 m^2 or 0.54 hectares (0.18 ha per site), and a summary is presented in Table 7. The restoration planting area in this study equates to 27,150 m^2 or 2.715 ha in total across the three sites (Priory Bay = 0.81 ha, Thorness = 0.67 ha and Beaulieu = 1.24 ha). There are two different values presented here; the actual area planted denotes the true planting area with seeds and plants, within designated quadrats, *i.e*. as part of the experimental design and therefore the area assessed during ecological monitoring particularly during emergence and survival for years 1 and 2. Whereas the restoration planting area or coverage includes the planted area coverage *i.e*. 0.54 ha in this example, in addition to the spaces, gaps and distance between actual planted area plots with a standardised buffer distance. The restoration planting area or coverage figure is therefore larger and can reflect the area where high-resolution movement or translocation of seeds and plants that can often occur following planting in year 1, or during the reproductive stages after year 1 if the seeds or plants reach this lifecycle stage, for several reasons.

Ideally in the experimental scientific design, the distance and gaps between planted areas plots would equally distributed but *in-situ* this doesn't account for high-resolution differences in sediment type or local morphological features on a site-by-site basis which therefore may not be suitable for seagrass planting. This is particularly true when considering different planting methodologies such as DIS *i.e.* a hard clay substrate would not allow the DIS device to penetrate the sediment surface without risk of breaking the device and seed density to be unequally distributed. The restoration planting area is also useful in assessing the spread or extension of the actual area planted into new terrain outside of the planting boundary which is an early indication for successful survival and resilience of seagrass. This area can also be useful in assessing seagrass extent and resilience during monitoring campaigns and aerial surveys *i.e. via* UAV, long after funding structures and project timelines have finished.

There has been a total of 27 field campaigns to satisfy the deliverables of the project these are summarised in Table 8. There has been a total of 10 field campaigns dedicated to monitoring the success of the planted plots. It should be noted that due to time constraints associated with resourcing and tide times, not every plot and site was monitored on each occasion.

These outputs align with deliverable aims *1.1 Design a major seagrass demonstration project with stakeholders / NE, 2.1 Collect sufficient healthy seagrass seeds and propagules in a sustainable manner to ensure planting success, 2.2 Process, sort and separate seagrass seeds and propagules ready for planting, 2.3 Store seeds and propagules in suitable environments ready for planting, then prepare seeds for planting, 2.4 Prepare seed bags and injectors for planting, 2.5 Undertake seagrass planting,* and are considered complete.

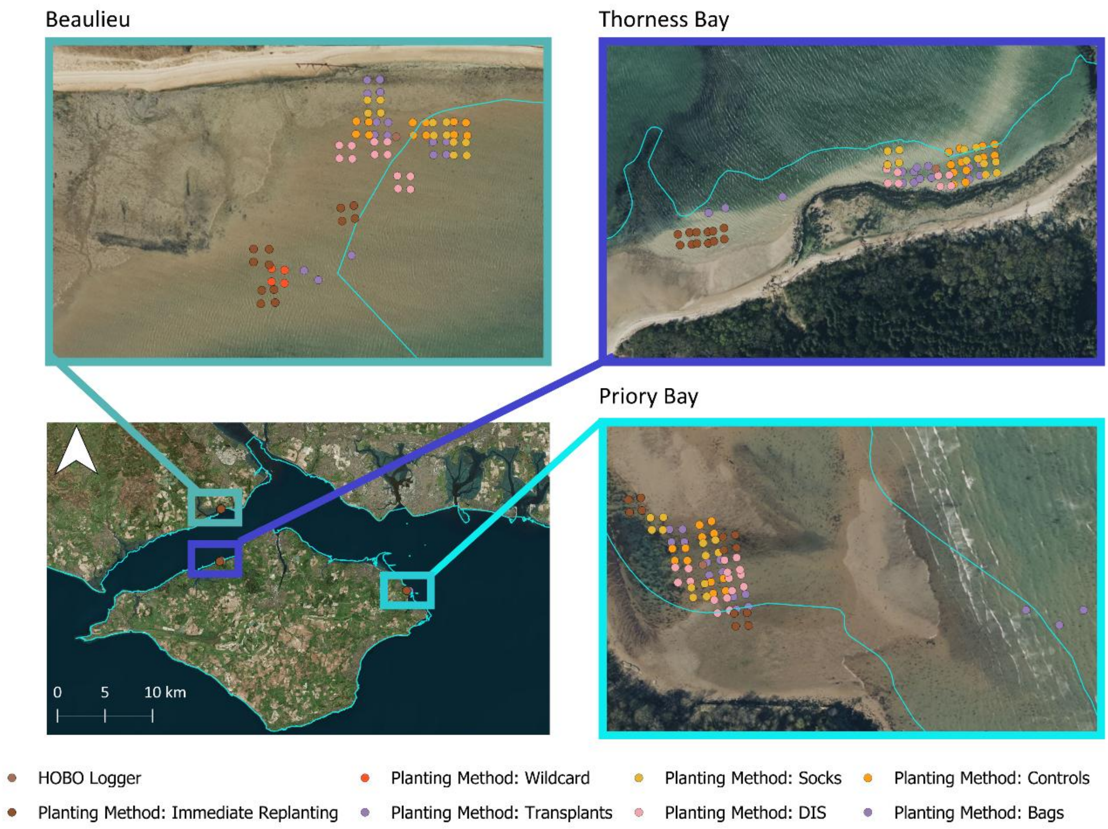

Figure 13. Planted *Zostera marina* treatment locations at each site.

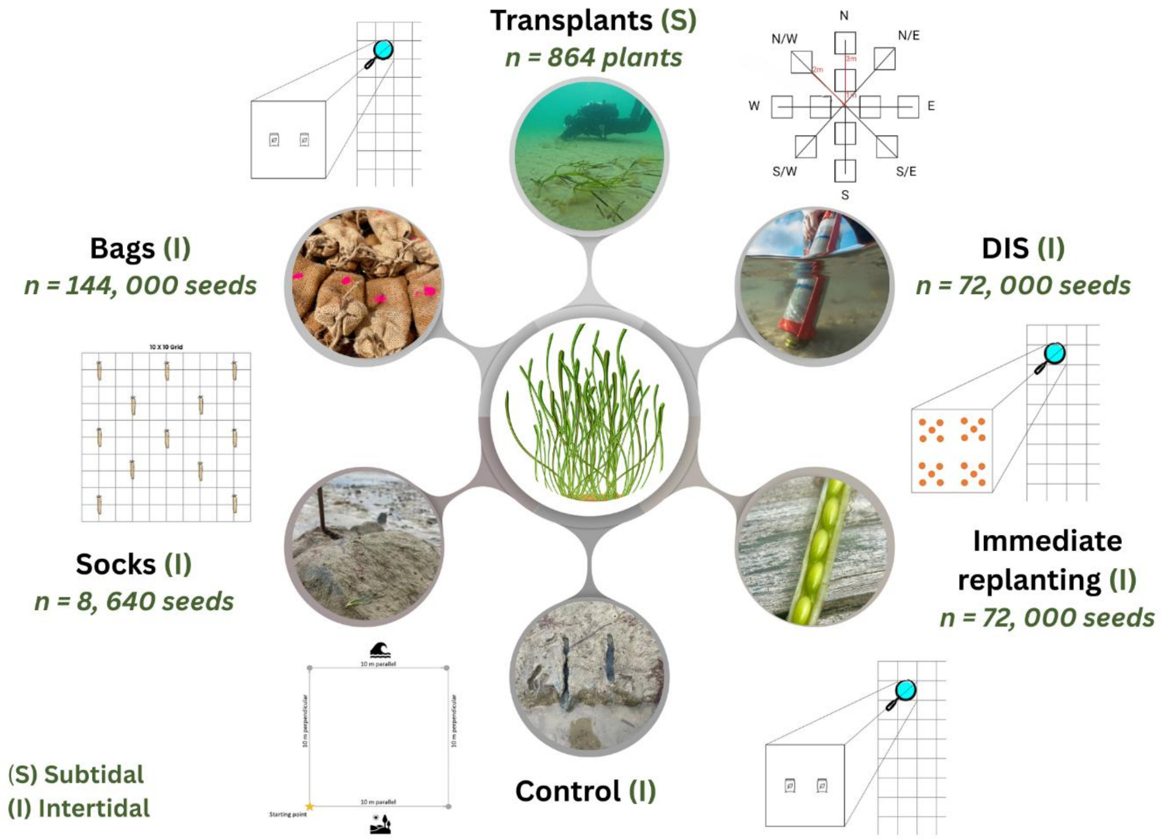

Figure 14. Schematic overview of *Zostera marina* planting methods and scientific design.

Table 6. Planting methods and planting densities of *Zostera marina* for each site location.

Location	Treatment	Number of treatments per plot	Quantity of treatments per site	Quantity of seeds/plants	Area per site (m^2)	Date planted
Thorness, Isle of Wight	Socks	12	36	80 seeds per sock	300 m^2 (10x10 m^2 per plot)	March 2023
	Bags	200	600	80 seeds per bag	300 m^2 (10x10 m^2 per plot)	March 2023
	DIS	37.5 canisters	112.5 canisters	80 seeds per 1m^2 (8000 seeds)	300 m^2 (10x10 m^2 per plot)	March 2023
	Immediate replanting (spathes)	200	600	80 seeds per 1m^2 (10 spathes) (8000 seeds/1000 spathes)	300 m^2 (10x10 m^2 per plot))	July 2023

	Transplants	96	288	8 shoots per 12 plots per replicate	300 m^2 (10x10 m^2 per plot)	July 2023
	Control	0	0	0	300 m^2 (10x10 m^2 per plot)	March 2023
Priory Bay, Isle of Wight	Socks	12	36	80 seeds per sock	300 m^2 (10x10 m^2 per plot)	March 2023
	Bags	200	600	80 seeds per bag	300 m^2 (10x10 m^2 per plot)	March 2023
	DIS	37.5 canisters	112.5 canisters	80 seeds per 1m^2 (8000 seeds)	300 m^2 (10x10 m^2 per plot)	March 2023
	Immediate replanting (spathes)	200	600	80 seeds per 1m^2 (10 spathes) (8000 seeds/1000 spathes)	300 m^2 (10x10 m^2 per plot)	July 2023
	Transplants	96	288	8 shoots per 12 plots per replicate	300 m^2 (10x10 m^2 per plot)	July 2023
	Control	0	0	0	300 m^2 (10x10 m^2 per plot)	March 2023
Beaulieu, Hampshire	Socks	12	36	80 seeds per sock	300 m^2 (10x10 m^2 per plot)	March 2023
	Bags	200	600	80 seeds per bag	300 m^2 (10x10 m^2 per plot)	March 2023
	DIS	37.5 canisters	112.5 canisters	80 seeds per 1m^2 (8000 seeds)	300 m^2 (10x10 m^2 per plot)	March 2023
	Immediate replanting (spathes)	200	600	80 seeds per 1m^2 (10 spathes) (8000 seeds/1000 spathes)	300 m^2 (10x10 m^2 per plot)	July 2023
	Transplants	96	288	8 shoots per 12 plots per replicate	300 m^2 (10x10 m^2 per plot)	July 2023
	Control	0	0	0	300 m^2 (10x10 m^2 per plot)	March 2023

Table 7. Summary of total *Zostera marina* seed and plant numbers as part of the in-field methodology experiment.

Method	**Total number of seeds/plants**	**Number of replicates per site**	**Total area planted per method**
Socks	8,640 seeds (108 socks)	3	900 m^2
Bags	144,000 seeds (1800 bags)	3	900 m^2
DIS	72,000 (337.5 canisters)	3	900 m^2
Spathes	72,000 seeds (9000 spathes)	3	900 m^2
Transplants	864 (900 collected)	3	900 m^2
Control	0	3	900 m^2

Table 8. Total summary of plots, seeds and area planted.

Total number of plots	54 plots (additional 4 plots at Beaulieu)
Number of plots per site	16
Total number of seeds	311,400
Number of seeds per site	103,800
Area planted per site	1,800 m^2 or 0.18 hectares
Actual total area planted	5,400 m^2 or 0.54 hectares
Restoration planting area	27,150 m^2 or 2.715 hectares

Table 9. SOR Solent fieldwork campaigns in the Solent and Isle of Wight

Phase	**Year**	**Month**	**Survey Type**	**Method**
Scoping Phase	2021	January	Habitat Suitability Modelling (HSM)	Desktop
	2021	April	Scoping drop-down camera surveys	Boat
	2021	June	Reproductive surveys	SCUBA
	2021	July	BRUV and Secchi disk surveys	Boat
	2021	August	Meadow Health surveys Subtidal seed collection	SCUBA
	2021	September	Tissue sample surveys	Boat
	2021	October	Planting trials	Intertidal
	2021	December	USV surveys	USV
Baseline Phase	2022	April	Baseline surveys Biodiversity surveys	Intertidal
	2022	May	Drop-down camera surveys	Boat
	2022	June	Trial planting assessment surveys, Biodiversity surveys	Intertidal
	2023	July	Seed collection	SCUBA
	2022	December	UAV surveys Ground truthing	UAV
Planting Phase	2023	February	Drop-down surveys	Boat
	2023	March	Planting: Methods – Bags, Socks, DIS, Control	Intertidal
	2023	May	Planting: Transplants (local collection and planting)	SCUBA
	2023	June	Planting: Immediate replanting	Intertidal
Monitoring Phase	2023	July	Subtidal seed collection Monitoring: Transplants	SCUBA
	2023	September	Monitoring: Bags, Socks, DIS, Control, Immediate replanting, transplants	Intertidal
	2024	January	Monitoring: Beaulieu	Intertidal
	2024	May	Monitoring: Priory Bay and Thorness	Intertidal
	2024	July	Meadow Health surveys Subtidal seed collection	SCUBA

	2024	October	Monitoring: Priory Bay and Thorness	Intertidal
	2025	January	Monitoring: Beaulieu	Intertidal
	2025	April	Monitoring: Priory Bay and Thorness UAV surveys	Intertidal
	2025	June	Monitoring: Priory Bay, Thorness, Beaulieu	Intertidal
Delivery Phase	2025	July	Meadow Health surveys Reproductive surveys Subtidal seed collection UAV surveys	SCUBA, Boat, UAV
	2025	September	BlueBoat surveys Monitoring: Priory Bay, Thorness, Beaulieu	Intertidal

Results

Seagrass shoot count

A two-way ANOVA revealed significant effects of both site and method on shoot density ($p < 2 \times 10^{-16}$). Post hoc (Tukey) pairwise comparisons with adjusted p-values showed that all sites differed significantly from one another, with Thorness exhibiting the highest values, followed by Priory Bay, and then lastly Beaulieu showing the lowest (all adjusted $p < 0.001$). Method comparisons indicated that transplants differed markedly from all other methods, producing substantially higher values than bags, control, DIS, Immediate replanting, and socks (mean differences ≈ 6–8 units; all adjusted $p < 0.001$). In contrast, control, bags, immediate replanting, and socks did not differ significantly from one another, while DIS showed intermediate performance, differing significantly from both lower-performing (control, bags) and higher-performing methods (immediate replanting, socks) (Figure 15).

Overall, these results indicate strong and practically meaningful effects of both site and method, driven primarily by the superior performance of the transplants method and systematic differences among sites (Figure 15).

In summary Thorness was considered the best site and Beaulieu the worst site, transplants were considered the best method (Figure 16) whilst DIS showing some positivity compared to the other methods (Figure 17). All the other methods were not significantly different *i.e.* Control, Bags, Socks, immediate replanting giving the same performance (Appendix III).

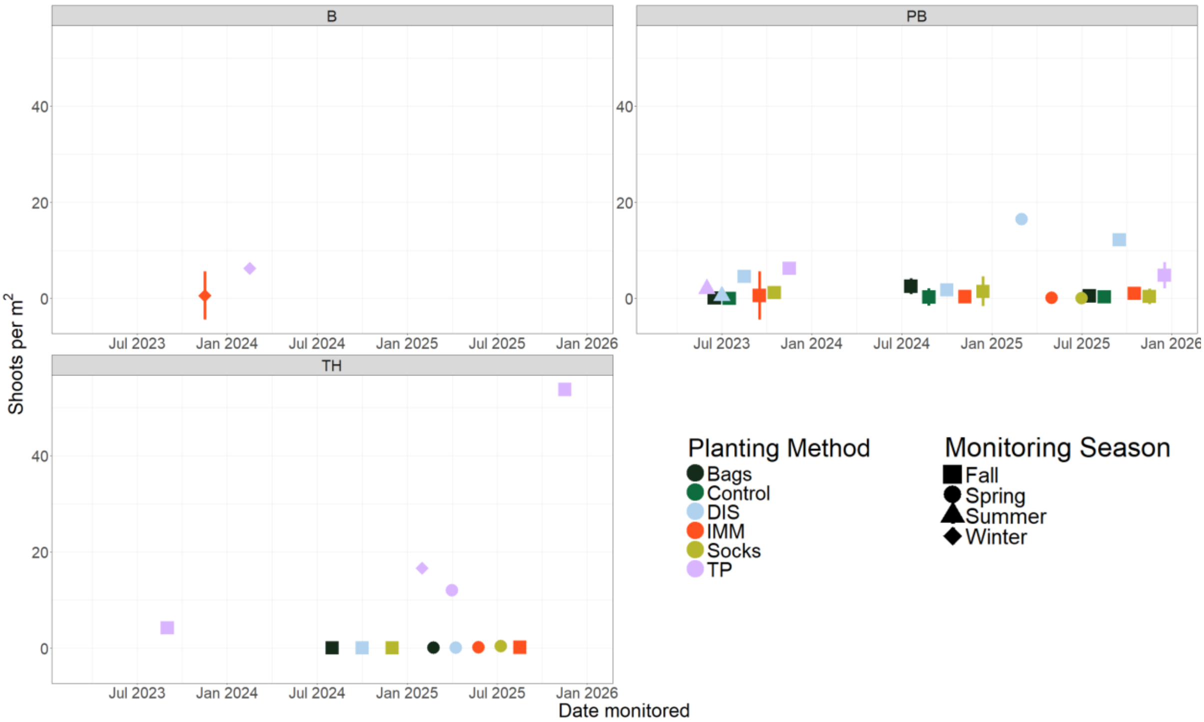

Figure 15. Average shoots per m^2 across the whole plot throughout the monitoring period. Sites are separated into separate frames: Beaulieu (B), Priory Bay (PB), Thorness (TH). Colours indicate different planting methods: hessian bags (black), control plots (dark green), dispenser injection seeding (light blue), immediate replanting (orange), socks (yellow), and transplants (pink). Shape indicates the season the plots were monitored in. Error bars are mean ± standard error.

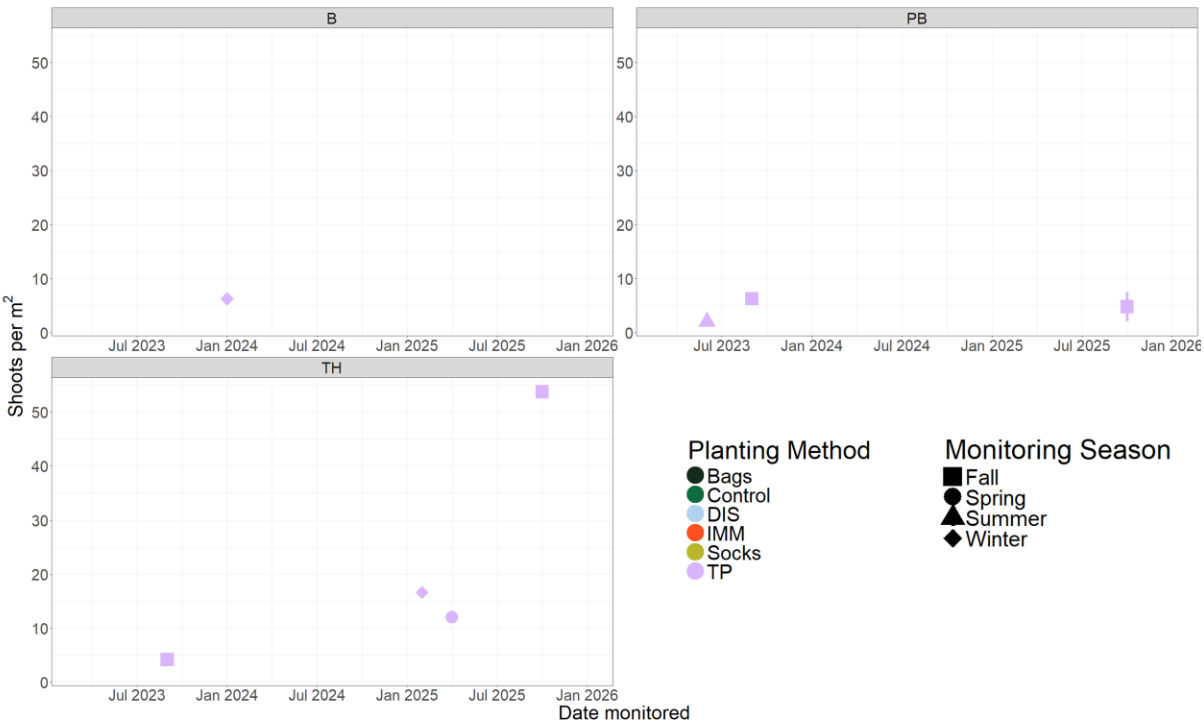

Figure 16. Average shoots per m^2 across the monitoring period for transplants. Sites are separated into separate frames: Beaulieu (B), Priory Bay (PB), Thorness (TH). Shape indicates the season the plots were monitored in. Error bars are mean ± standard error.

If we remove transplants from the methods datasets the ANOVA test indicates significant differences among both sites and methods. The sites are significantly different (*p=1.42e-14*), the method is significantly different (*p=6.21e-11*), and the site by method is significantly different (*p=2.08e-12*) (Figure 17).

Tukey post-hoc pairwise comparisons with adjusted p-values showed that site Priory Bay differed significantly from both Thorness and Beaulieu, exhibiting higher values than either (adjusted $p < 0.001$), whereas Thorness and Beaulieu did not differ significantly from one another (adjusted $p \approx 1$) when transplants were removed from the ANOVA dataset.

For methods, comparisons between control, bags, immediate replanting, and socks were not significant, indicating broadly similar performance among these methods. In contrast, DIS showed intermediate performance, yielding significantly higher values than bags and control methods, but significantly lower values than immediate replanting and socks (all adjusted $p < 0.001$). Overall, these results indicate that observed differences were driven primarily by the elevated values at site Priory Bay and by clear contrasts between the DIS method and both lower- and higher-performing methods (Appendix III).

Thorness in general is showing an upward trajectory of seagrass shoots over time for the transplant method, based on field campaigns since 2023 (Figure 15).

In summary for shoot height with transplants removed from the dataset, Priory Bay is the best site, with Beaulieu and Thorness not being significantly different from one another and DIS demonstrating the best seagrass planting method.

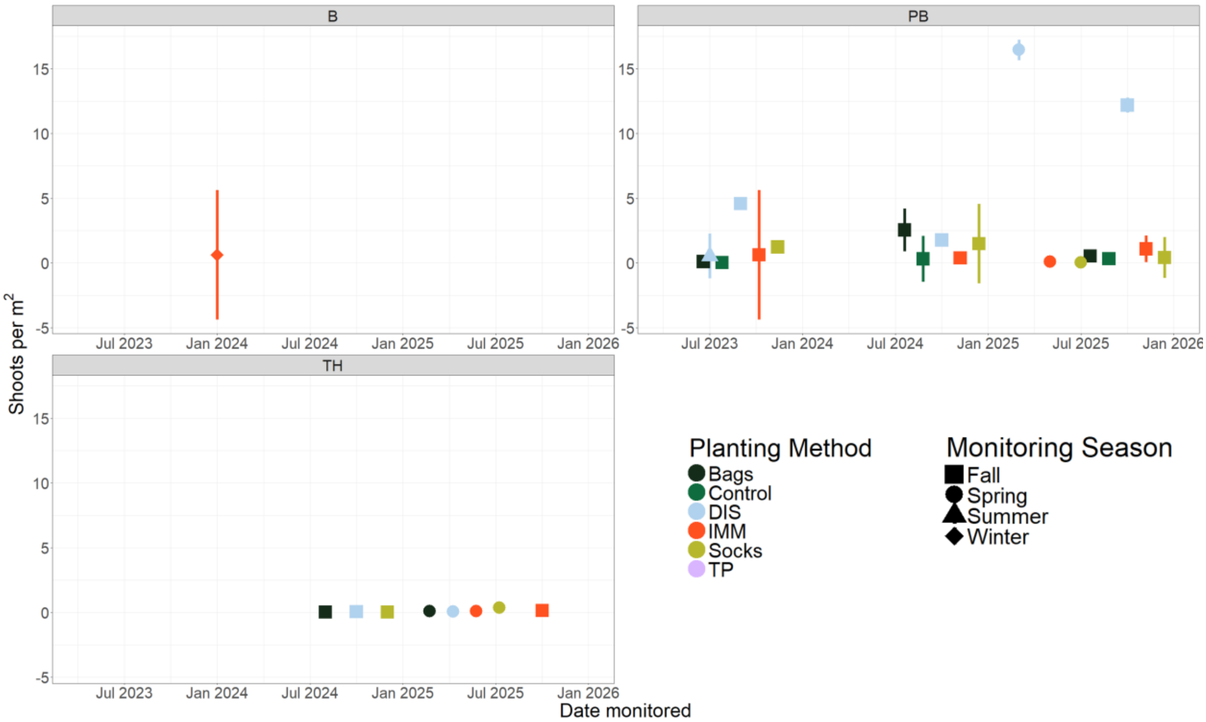

Figure 17. Average shoots per m2 across the whole plot throughout the monitoring period, excluding transplants. Sites are separated into separate frames: Beaulieu (B), Priory Bay (PB), Thorness (TH). Colours indicate different planting methods: hessian bags (black), control plots (dark green), dispenser injection seeding (light blue), immediate replanting (orange), socks (yellow). Shape indicates the season the plots were monitored in. Error bars are mean ± standard error.

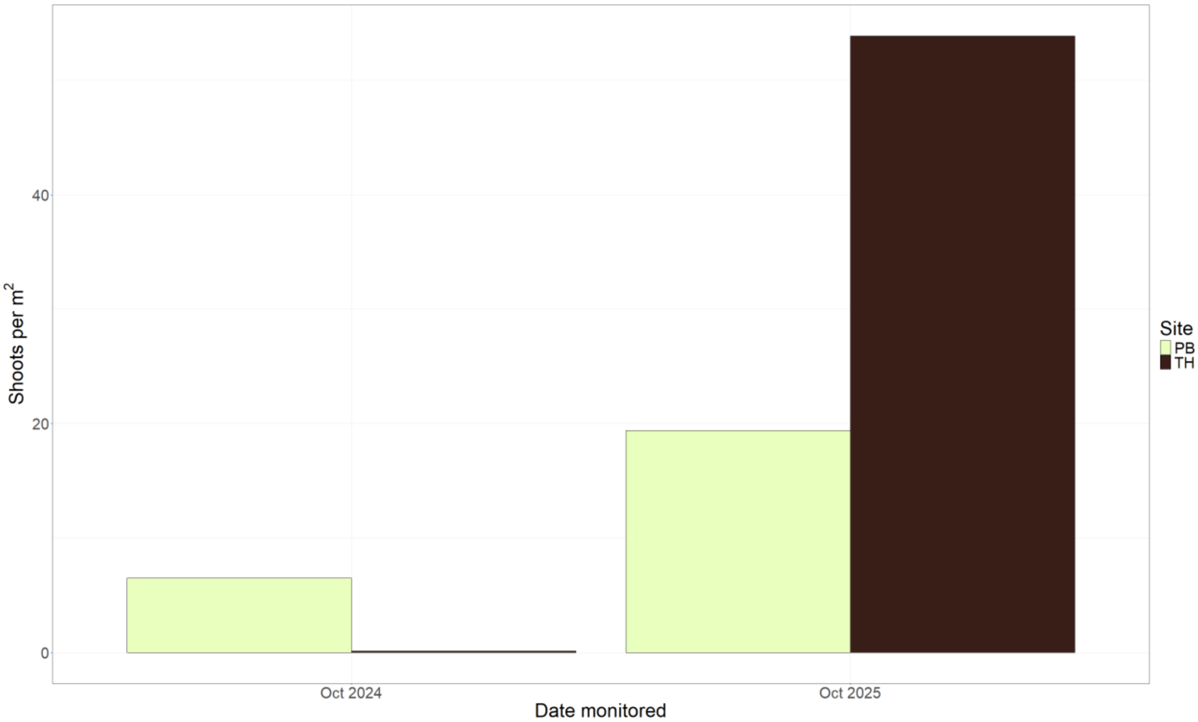

Figure 18. Shoots per m^2 at Priory Bay (PB) and Thorness (TH) in October 2024 and October 2025. Colours distinguish sites, PB is in green, TH is in brown. Graph shows a 400x increase in shoot density at TH between the two years. Shoot density at Priory Bay tripled over the same period.

Seagrass shoot height

A two-way ANOVA examining the effects of site and method on average including all methods in the dataset (excluding the "Wildcard" method) revealed significant main effects of both factors on shoot height.

Post-hoc Tukey pairwise comparisons with adjusted p-values indicated that all sites differed significantly from one another, with Thorness exhibiting the highest values, followed by Priory Bay, and Beaulieu showing the lowest (all adjusted $p \leq 3.7 \times 10^{-6}$). Method comparisons showed that control, bags, immediate replanting, and socks did not differ significantly from one another, indicating similar performance among these methods. In contrast, DIS exhibited significantly from all other planting methods based on the Tukey post-hoc for ANOVAs). The transplant method differed markedly from all other methods, producing substantially higher values than bags, control, DIS, immediate replanting and socks (mean differences ≈ 4.9–5.5 cm; all adjusted $p < 0.001$) (Figure 20).

Overall, these results demonstrate strong and consistent effects of both site and method driven primarily by elevated values at site Thorness and by the pronounced superiority of the transplants method. Therefore, Thorness has the longest seagrass shoot lengths and so do the transplants. DIS planting method exhibits the second longest leaf lengths with Priory Bay demonstrating the second site with the longest leaf lengths.

The results indicate that the site and method both matter in seagrass restoration design and execution. In this case, Thorness is the best site with transplants being the main planting method followed by DIS.

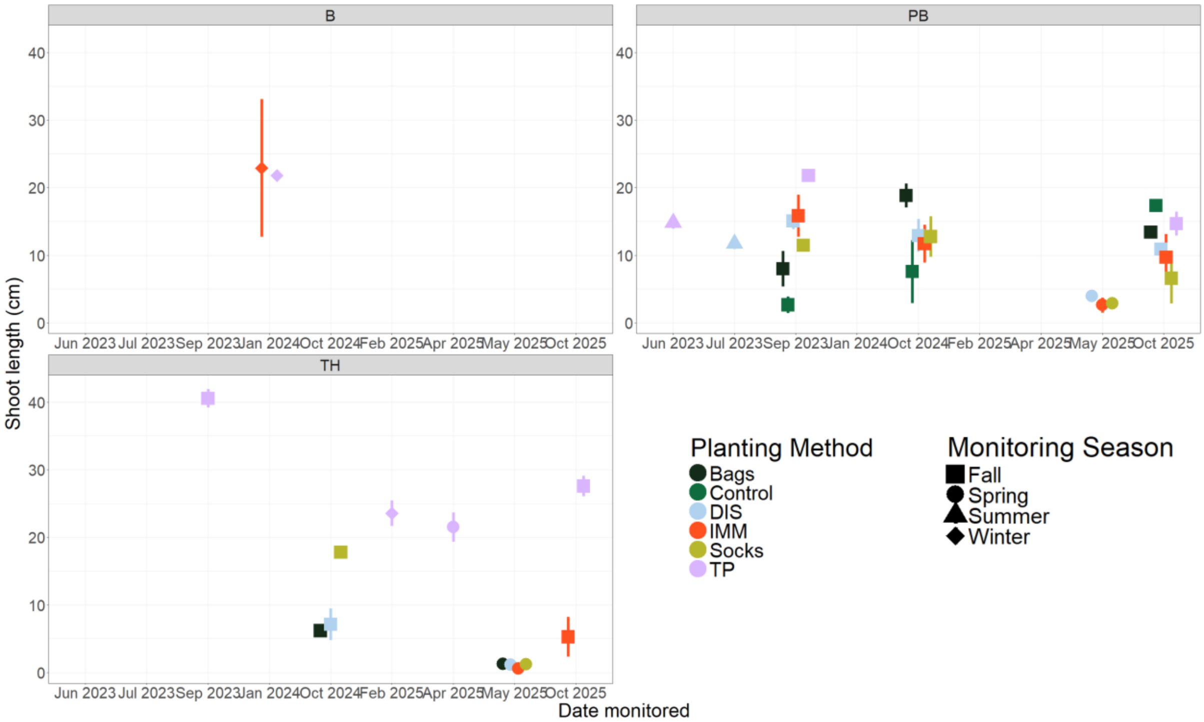

Figure 19. Shoot length (cm) throughout the monitoring period. Sites are separated into separate frames: Beaulieu (B), Priory Bay (PB), Thorness (TH). Colours indicate different planting methods: hessian bags (black), control plots (dark green), dispenser injection seeding (light blue), immediate replanting (orange), socks (yellow), and transplants (pink). Shape indicates the season the plots were monitored in. Error bars are mean ± standard error.

To quantify field-scale spatial variation in seagrass extent and to monitor post-planting growth at each site, Unmanned Aerial Vehicles (UAVs) equipped with multispectral sensors were deployed in 2024 and 2025. Annual UAV surveys are planned to continue this monitoring in future years (Figure 21).

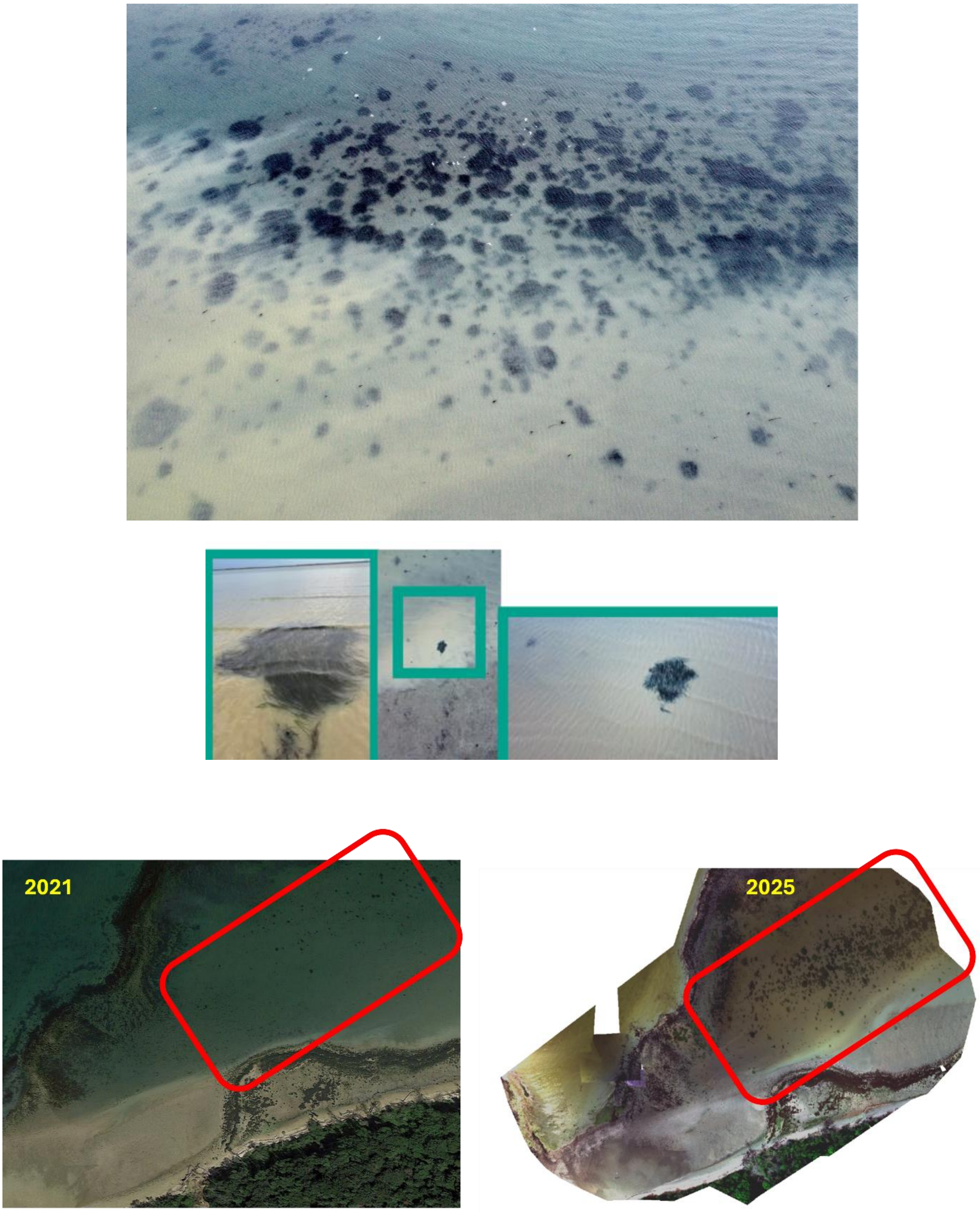

Figure 20. UAV imagery of seagrass expansion from transplant method in Thorness using multi-rotor UAV DJI Mavic (top) Wingtra multispectral UAV orthomosaic (bottom).

Meadow Expansion and Dispersal Dynamics

Observation of Unplanned Meadow Expansion

As part of our active restoration efforts, seagrass was introduced into targeted areas within two bays on the Isle of Wight, locations historically characterised by limited existing seagrass coverage (initial surveys had recorded the odd seagrass shoot but no patches). Since the project's inception, we have observed a highly encouraging development: the emergence of numerous supplementary patches of seagrass within these bays. However, unequivocally attributing their origin to our specific planting interventions remains methodologically challenging for one primary reason: these newly established patches have emerged in locations explicitly distinct from our designated seeding and transplanting plots.

Because these emergent patches do not spatially overlap with where we physically placed our materials, we cannot establish a direct, localised link to our restoration efforts. The ecological mechanics of seagrass seed movement within dynamic coastal environments are complex and notoriously difficult to track. However, the active restoration methodologies employed in this study inherently left seeds and propagules susceptible to natural tidal and wave-driven movement prior to their successful germination and rooting. Because of this susceptibility to physical dispersal, it is highly probable (and we cautiously assume) that these new, spatially separated patches are a direct, dispersed consequence of our initial work. It is likely that seeds were transported by local hydrodynamics, settling and establishing beyond the defined boundaries of our experimental areas. While we cannot mechanistically prove this causal link without extensive genetic testing, the temporal correlation strongly suggests our interventions acted as a catalyst for this broader emergence.

This assumption aligns seamlessly with broader seagrass restoration literature. Evidence from analogous projects demonstrates that once an initial population is introduced to a system, natural hydrodynamic forces will disperse seeds, and subsequent in situ reproduction accelerates secondary spatial expansion. Quantifying the exact spatial extent of this expansion presents a distinct monitoring challenge, as the distribution of these newly established beds is inherently patchy, making precise areal mapping difficult. Nevertheless, collectively, these emergent, unplanned patches form significant new areas of benthic habitat. Regardless of our ability to definitively trace their mechanical origin, they represent a tangible increase in regional seagrass coverage, directly contributing to enhanced biodiversity, nursery habitat provision, and the overall primary productivity of the Solent marine ecosystem.

Engagement, Outreach and Community

Aim 3 | Secure the future of healthy seagrass at restoration sites and ensure a diverse range of people are engaged and benefit from the project

There has been strong and consistent effort to attend and provide engagement, outreach, and community events over the course of this partnership from 2022-2025 (Table 10). We have developed numerous relationships both locally and further afield, which are reflected in the work that has been achieved and the legacy carried forwards. There are highly active working groups and numerous partners and organisations that now work within the seagrass space in the Solent, of which we remain a collaborator.

A central component of the volunteer and outreach programme has been the annual seagrass seed-harvesting activities conducted on Isle of Wight beaches during the summer months. These activities were delivered annually, except for 2023, when they were suspended intertidally due to staffing constraints, but seed collection continued sub-tidally. The seed-harvesting events were designed to be inclusive and accessible to the local community, offering both snorkelling opportunities for confident participants and shallow-water wading options suitable for children, older adults and opportunities to learn about seagrass and our restoration efforts.

Outreach and engagement efforts were deliberately structured to reach a broad range of demographic groups, including educational presentations in schools and boat clubs, as well as participation in family-oriented festivals and arts-based events e.g. Art installation at Quay Arts Centre on the Isle of Wight.

In addition, the Fragment Walk volunteer initiative has been particularly effective in fostering local stewardship of seagrass habitats, evidenced by sustained engagement and a cohort of long-term, repeat volunteers.

Liz Earle has been a supportive project partner throughout, providing a venue for planting preparation workshops and project partner meetings, and with staff from the organisation joining our seed harvest efforts in July 2024.

Table 10. Number of engagements, outreach and community events, talks, workshops and conferences and volunteers supported in the Solent and Isle of Wight per year. * estimate

Year	Number of engagement, outreach and community events	Number of talks, workshops and conferences*	Number of recorded volunteers supported	Number of interactions with members of the public
2022	7	unknown	5	5730*
2023	12	9	27	1685*
2024	25	11	351	885
2025	17	5	108	998
Total	**61**	**25**	**491**	**9298**

Over the full reporting period, a total of 61 outreach and engagement activities were delivered across the Solent and Isle of Wight, reaching an estimated 9,298 individuals over the four-year programme. The Fragment Walk initiative, launched in 2024, has continued to build momentum (Table 12) and is expected to progress further beyond the reporting period.

A detailed breakdown of outreach and engagement activities conducted between 2022 and 2025 is provided in Table 11, with presentations, talks, and conference contributions summarised in Table 10.

Key achievements during the reporting period include:

- Installation of Advanced Mooring Systems (AMS) at Seaview in collaboration with Warren Boats and Blue Parameters
- Implementation of an annual ground-truthed Unmanned Aerial Vehicle (UAV) survey campaign (see Figure 20).
- Art exhibition in collaboration with local Isle of Wight College
- Completion and installation of seagrass interpretive signage artwork
- Delivery of 61 outreach and volunteer engagement events
- Engagement with 9,298 individuals
- Support for the delivery of seagrass-focused talks and educational materials to four Isle of Wight schools
- Presentation of SOR Solent research at the European Seagrass Restoration Alliance (ESRA) conference in France in early 2025
- Dissemination of four editions of the *Solent* newsletter
- Expansion of Fragment Walks through collaboration with additional community-based volunteer groups
- Planting of 498 seagrass fragments through the Fragment Walk initiative

Table 11. Outreach and engagement events for the reporting period 2022-2025.

Date	Event Name	Event Type	Number of direct interactions/volunteers
30/06/2022-01/07/2022	Noel Turner Science Festival	Engagement Activity	2045
8/07/2022	Rhythm Tree Festival	Engagement Activity	30
Jul-22*	Under The Pier Seagrass Collection Volunteer sessions	Volunteering	5
Aug-22*	Branstone Farm Launch	Engagement Activity	200
24/09/2022	Fort Victoria Biosphere Day	Engagement Activity	400
15/10/2022	Hullabaloo Festival	Engagement Activity	3000
12/11/2022	IW Recorders Conference	Talk	50
Apr-23*	Seagrass Watch Training	Training	27
01/07/2023	FOCAS Festival @ Wildheart	Engagement Activity	-
13/11/2023	Priory Bay Fieldtrip	Engagement Activity	8
14/11/2023	IWEF School Visit	Presentation/Interactive Session	250
15/11/2023	Greenmount School Visit	Presentation/Interactive Session	60
15/11/2023	Ryde School Visit (Year 5)	Presentation/Interactive Session	60
15/11/2023	Ryde School Visit (Year 10-11)	Presentation/Interactive Session	185

15/11/2023	Ryde School Visit (Year 7-8)	Presentation/Interactive Session	234
16/11/2023	Seagrass Game	Engagement Activity	10
16/11/2023	Seagrass Spotter Meadow Walk	Engagement Activity	-
17/11/2023	Ryde School Visit (Year 6)	Presentation/Interactive Session	174
17/11/2023	Ryde School Visit (6th Form)	Presentation/Interactive Session	154
17/01/2024	Seagrass - Winter Series	Presentation	71
02/03/2024	From The Ground Up Sustainability Event	Engagement Activity	55
05/03/2024	Fragment Walk	Volunteering	-
16/03/2024	SOTSEF	Engagement Activity	200
20/03/2024	Fragment Walk	Volunteering	3
03/04/2024	Fragment Walk	Volunteering	17
12/05/2024	Bucklers hard family conservation awareness day	Engagement Activity	100
14/05/2024	Isle of Wight walking festival	Engagement Activity	35
18/05/2024	Hullabaloo	Engagement Activity	100
03/05/2024	Solent Seascape - Fish Survey at Langstone	Survey	10
05/06/2024	Boots/Liz Earle Lunch and Learn	Talk	-
08/06/2024	WOD Rachel Bebb contemporary art	Engagement Activity	60
29/06/2024	Biosphere Festival - Snorkel Safari	Engagement Activity	15
23/07/2024	Seagrass wade and pick	Volunteering	111
27/07/2024	PSG Talk local group, Brightstone Church	Talk	35
27/08/2024	Cowes week	Engagement Activity	15
04/09/2024	Private corporate event	Corporate	14
22/09/2024	Southampton International Boat show	Talk	15
01/10/2024	Fragment Walk	Volunteering	6
15/10/2024	Fragment Walk	Volunteering	7
19/10/2024	Thorness intertidal survey	School Session	4
14/10/2024	Fragment Walk	Volunteering	4
14/11/2024	Fragment Walk	Volunteering	4
29/01/2025	Fragment Walk	Volunteering	4
27/02/2025	Fragment Walk	Volunteering	6
28/02/2025 - 31/03/2025	IOW collage Art Exhibition – Quay Arts Centre	Engagement Activity	-
04/03/2025	Marine Citizen Science Week (Plymouth)	Engagement Activity	50
27/03/2025	Fragment Walk	Volunteering	6
27/03/2025	Quay Arts - An audience with Project Seagrass	Talk	51
28/03/2025	Transplant and Seed preparation workshop	Workshop	28
08/04/2025-10/04/2025	WWF Chairs Challenge	Engagement Activity	24
10-12/05/2025	Isle of Wight Spring Walking Festival - Fragment Walk	Engagement Activity	58
30/06/2025	Solent Newsletter Summer 2025	Engagement Activity	129
28/06/2025 - 06/07/2025	Isle of Wight Biosphere Festival and FOCAS festival	Engagement Activity	450
11-17/07/2025	Solent Seed Harvesting 2025	Volunteering	27
08/09/2025	Fragment Walk	Volunteering	12

08/10/2025	Isle of Wight Autumn Walking Festival – Fragment Walk	Volunteering	11
04/11/2025	Fragment Walk	Volunteering	9
06/12/2025	Solent Newsletter Winter 2025	Engagement Activity	133
Total			**7057**

*Estimate

Conservation Actions

In accordance with Deliverable 3.1, *Commence aligned seagrass conservation actions*, a programme of targeted engagement activities was undertaken with local yacht clubs on the Isle of Wight to raise awareness of sustainable anchoring and mooring practices in and adjacent to seagrass habitats. As part of this programme Project Seagrass CEO delivered a presentation to Cowes Island Sailing Club in November 2024. Engagement with additional yacht clubs was supported through the distribution of *Seagrass Safe Sailor* coasters within clubhouses. These materials incorporate a QR code directing users to a dedicated Project Seagrass webpage on Advanced Mooring Systems (AMS), developed as a direct output of this deliverable.

Complementary to these activities, we participated for a second consecutive year as a panellist at the Southampton International Boat Show (SIBS), engaging with marine practitioners and the wider sailing and boating community on the importance of responsible anchoring and mooring in sensitive marine environments.

In May 2025, two subtidal Mermaid-K Advanced Mooring Systems were deployed at Seaview in collaboration with Warren Boats and Blue Parameters funded by the Seacology project (Figure 23, Photo 1). This passive restoration intervention represents the first phase of a wider AMS installation programme at the site, with further installations planned following partner discussions. Additional funding secured from The Crown Estate will support the installation of AMS at Priory Bay to reduce recreational anchoring and mooring pressure within restoration areas, including sites previously planted under WWF initiatives and areas of former natural seagrass meadow that have subsequently declined. As part of the Priory Bay project, baseline monitoring of the immediate AMS deployment area within the seagrass meadow. A comprehensive stakeholder engagement and consultation phase will be initiated across Priory Bay, involving collaboration with landowners, regulatory bodies, and other relevant stakeholders. This will be supported by an initial boat-use study to inform management actions.

Unmanned Aerial Vehicle (UAV) surveys incorporating Real-Time Kinematic (RTK) positioning and ground-truthing were conducted across multiple Isle of Wight sites in May 2025 and will subsequently be completed annually to assess and demonstrate seagrass restoration efforts.

In addition, seagrass interpretive signage has been commissioned and printed and is awaiting installation at key Isle of Wight locations, specifically Seaview, Ryde, and St Helens (Figure 19). The signage has been designed as an educational resource for the local community, highlighting priority seagrass meadows supported by Project Seagrass and outlining opportunities for public involvement in active restoration and citizen science initiatives and will contribute towards our conservation legacy on the island.

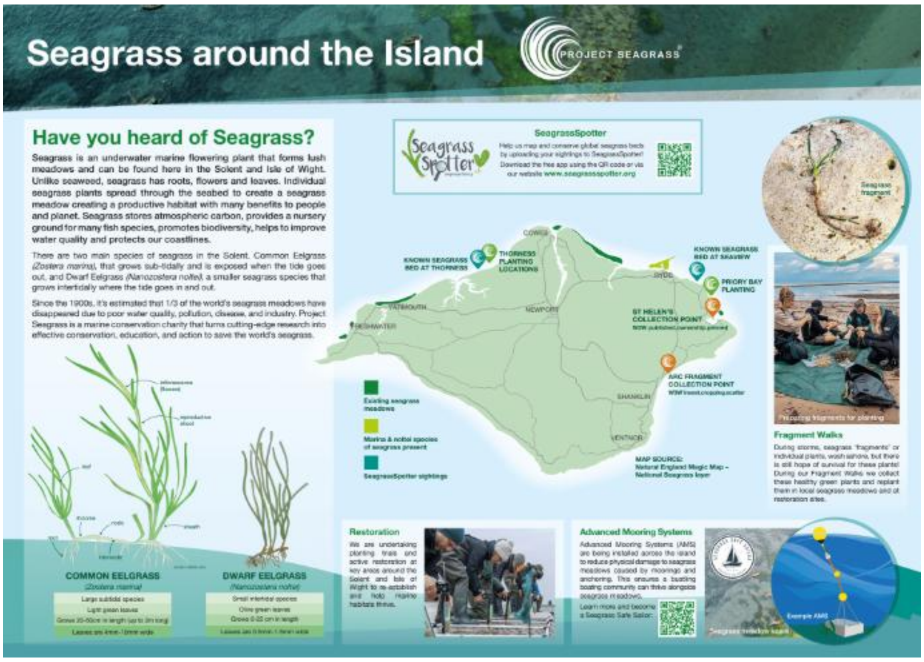

Figure 21. Educational seagrass signage proof to be installed at key locations on the Isle of Wight.

Fragment Walks

Fragment Walks are a community-based restoration initiative that utilises uprooted and/or washed-up seagrass fragments deposited on beaches following storm events to undertake small-scale seagrass restoration in targeted areas by community and volunteer support and stewardship.

The approach was initially trialled on the Isle of Wight as a proof of concept in September 2024, with subsequent planting into designated restoration plots commencing in October 2024. Since inception, the Fragment Walk methodology has been iteratively refined in response to project developments, lessons learned, and the adoption of more efficient practices and delivery approaches.

Fragment Walk activities are deliberately scheduled during the stormier months, typically between September and March or April, enabling this form of active restoration to be undertaken outside the main large-scale restoration season and thereby extending restoration efforts across the year. To date, 15 Fragment Walks have been conducted since the first event in September 2024, engaging a total of 308 volunteers (Table 12).

In April 2025, participants in the WWF Chairs Challenge visited the Isle of Wight and took part in a Fragment Walk at Priory Bay, alongside additional seagrass meadow mapping activities at Seaview. During the latter half of 2025, the Fragment Walk programme will transition towards a greater emphasis on monitoring previously planted fragments. This will require extended session durations to accommodate both restoration activities and associated monitoring protocols.

As a volunteer-led initiative, promotion of Fragment Walks is primarily undertaken through social media channels, particularly Instagram. Interest in this community-based restoration approach has continued to grow, with the Fragment Walk programme being adopted by North Wales Wildlife Trust. In addition, collaboration with Red Funnel Ferries has enabled the development of informational content for onboard television screens, raising awareness of Fragment Walks and seagrass meadows around the Isle of Wight.

This alignment approach across multiple organisations provides an actionable response to the deliverable *3.1 commence aligned seagrass conservation actions*, in addition to *3.2 Empower local communities to undertake future seagrass monitoring and restoration activities*.

Table 12. Solent Fragment Walks

Year	Number of Fragment Walks	Number of Volunteers	Number of Transplants Collected	Number of Transplants Planted	Number of m2 planted	Number of Transplants Survived
2024	6	214	329	306	17	0
2025	7	76	169	156	10	65
2026	2	18	601	126	7	TBC
Total	**15**	**308**	**1099**	**588**	**34**	**65**

Fragment Walks are primarily conducted at St Helens Beach and Priory Bay, with particular emphasis on planting within the recently lost intertidal seagrass meadow at Priory Bay (Figure 20). Planting densities within each 1 m² plot are consistent with those used in subsequent large-scale restoration projects (*e.g.,* 18 plants per 1 m²), allowing for direct comparison of outcomes. A trial and control plot has also been established at Thorness, although the site presents limited opportunities for volunteer engagement.

To date, a total of 34 m² has been planted using 588 locally sourced meadow transplants. Transplant survival has been observed in four of the thirteen plots, including the plot at Thorness. Sediment at locations A–H has become coarser, which may have contributed to lower transplant survival at these sites. In contrast, transplant survival has been successful at locations J and K, which will be the strategic focus for future planting efforts (Figure 20). Among the surviving transplants, plots I, J, K, and the control at Thorness exhibited survival rates of 211%, 72%, 67%, and 9%, respectively (Figure 21).

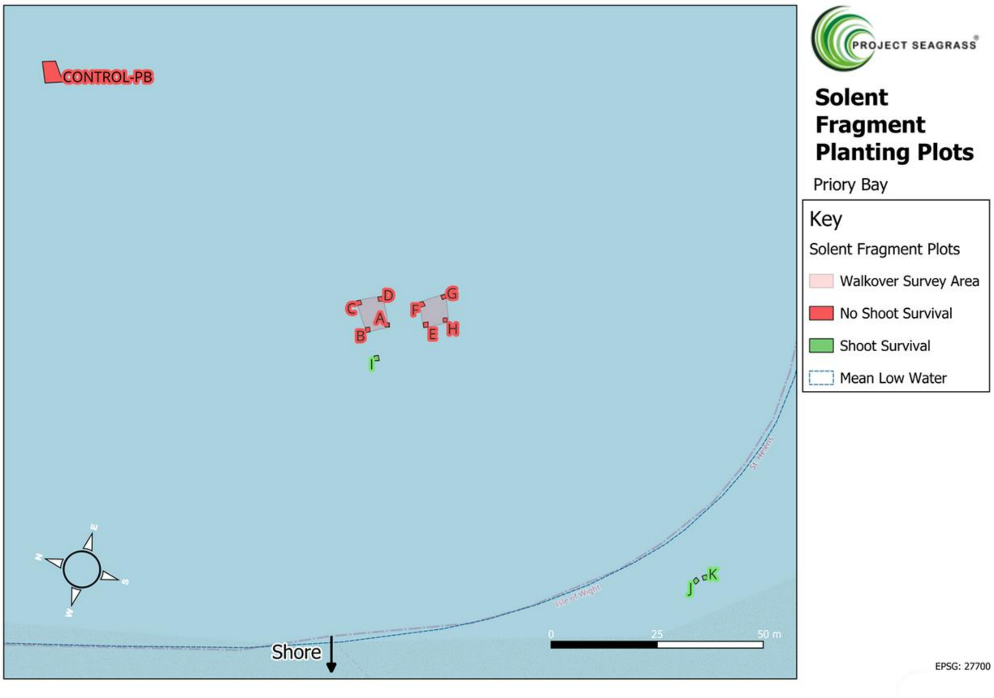

Figure 22. Fragment walk planting locations at Priory Bay

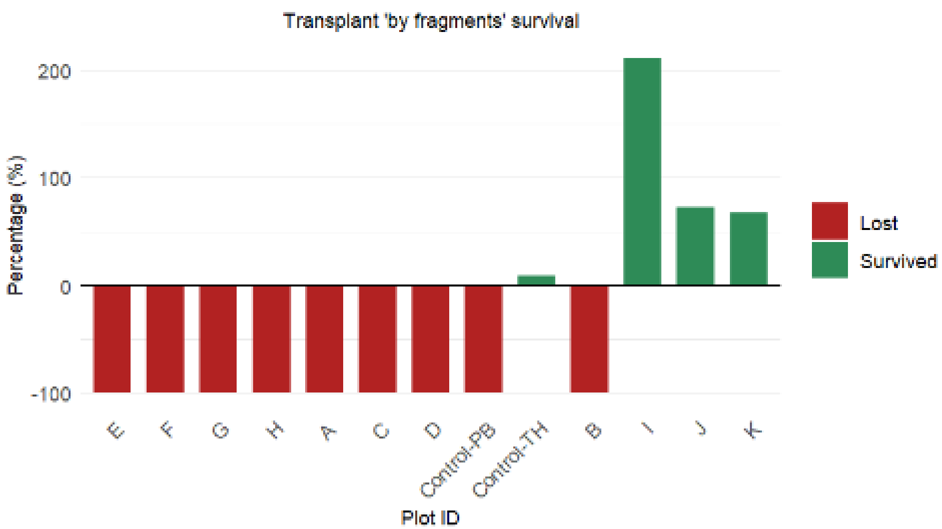

Figure 23. Transplant survival per plot at Priory Bay

Other community-based volunteering opportunities

In addition to Fragment Walks Project Seagrass facilitate under deliverable *3.2 Empower local communities to undertake future seagrass monitoring and restoration activities*, volunteering opportunities to join monitoring fieldwork, and to take part in the planting preparation workshops in March 2023-2025.

The recurring planting preparation workshops held with Lis Earle at Liz Earles HQ demonstrates the positive outcomes that can happen when project partners, corporate partners, and local community all collaborate towards conservation and restoration efforts. In 2024 and 2025 these planting preparation workshops were in aid of the Solent Seascape Project and contribute to the further seagrass conservation actions.

We have been involved in 2024 and 2025 in the Isle of Wight Walking Festival, with a Fragment Walk being held in the spring walking festival. This event helps the Fragment Walk initiative reach a wider audience, as it is a popular family event that is widely advertised across the island.

Conferences, Talks, and Workshops

There has been delivery of 25 talks and conferences relating to the WWF Seagrass Ocean Rescue Project across the four years of the project reporting. These further support the project deliverables under Aim 3 of the project *e.g. 3.2; empower local communities to undertake future seagrass monitoring and restoration activities, 3.3 achieve long-term support for stored seagrass from local stakeholders and communities (deliverables 3.1, 3.2, 3.3, 3.4)*.

In 2023, the project team participated in one local and one national seagrass conference: the Isle of Wight and Solent Seagrass Symposium in Cowes, and the UK Seagrass Symposium in Plymouth. These events facilitated the exchange of scientific knowledge and strengthened the regional community engaged in seagrass conservation and restoration within the Solent. During the same year, a programme of talks and interactive activities was delivered across three schools over the course of one-week, engaging students aged 5–18 years and supported by the distribution of seagrass-focused educational resource packs.

The highest level of activity for talks, conferences, and workshops occurred in 2024 (Table 9), beginning with participation in the online Coastal Futures Conference in January. A key highlight was attendance at the ISBW World Seagrass Conference in Naples, Italy, with a presentation on the early findings from the SOR Solent project to an international audience.

In 2025, an organisational update on the Solent Seascape Project (SSP) was delivered as part of the Winter Seminar Series in January to a large online audience with the same series planned for 2026. While the presentation focused primarily on SSP activities, it also incorporated restoration science and evidence derived from the WWF Seagrass Ocean Rescue (SOR) project, demonstrating how project findings have informed and refined restoration practices and presenting to our stakeholders and local community. Project Seagrass was invited by Natural England to contribute to Marine Citizen Science Week in Plymouth, where the Fragment Walk, initiative was presented to fellow marine practitioners and regulators.

Throughout March 2025, Quay Arts hosted a collaborative exhibition developed by Project Seagrass, photographer Theo Vickers, and the Isle of Wight College. The exhibition culminated in a public evening event titled *"Seagrass: A Solent Story"*, featuring presentations and talks delivered jointly by Project Seagrass, Hampshire and Isle of Wight Wildlife Trust, and Theo Vickers.

Collectively, these activities contribute directly to Deliverable 2.7: *Improve wider understanding of the science of seagrass restoration*.

Table 13. 2023-2025 table of talks and conferences to date.

Date	Name	Location	Type	Online or In-person	Duration
18/04/2023	Isle of Wight & the Solent Seagrass Symposium	Cowes, Isle of Wight	Conference	In-person	1 day
11/09/2023	UK Seagrass Symposium	Plymouth	Conference	In-person	2 days
14/11/2023	IWEF School Talk	Newport, Isle of Wight	Talk	In-person	30 min
15/11/2023	Greenmount School Talk	Ryde, Isle of Wight	Talk	In-person	30 min
15/11/2023	Ryde School Talk (Year 5)	Ryde, Isle of Wight	Talk	In-person	30 min
15/11/2023	Ryde School Talk (Year 10-11)	Ryde, Isle of Wight	Talk	In-person	30 min
15/11/2023	Ryde School Talk (Year 7-8)	Ryde, Isle of Wight	Talk	In-person	30 min
17/11/2023	Ryde School Talk (Year 6)	Ryde, Isle of Wight	Talk	In-person	30 min
17/11/2023	Ryde School Talk (6th Form)	Ryde, Isle of Wight	Talk	In-person	30 min
24/01/2024	Coastal Futures 2024 Conference	Online	Conference	Online	2 days
16/05/2024	SSP Core Meeting	Portsmouth	Talk	In-person	1 day
17/06/2024	ISBW World Seagrass Conference (2024 WSC) & 15th International Seagrass Biology Workshop (ISBW15)	Naples, Italy	Conference	In-person	5 days
28/06/2024	Environment Agency Lunch and Learn	Online	Talk	Online	1 day
28/08/2024	SSP - Seagrass Workshop	Cowes, Isle of Wight	Talk	In-person	1 day
22/09/2024	SIBS 24 - Panel Talk	Southampton	Panel talk	In-person	1 day
01/10/2024	LIFE Recreation Remedies End of Project Conference	Plymouth, National Marine Aquarium	Conference	In-person	1 day
17/10/2024	SSP Core Meeting	Online	Talk	Online	1 day
19/11/2024	Project Seagrass Talk to Cowes Island Sailing Club	Cowes Island Sailing Club, Cowes, Isle of Wight	Talk	In-person	1 day
26/11/2024	Tuesday Talkfest - Solent: A year in review	HQ	Talk	In-person	1 day
27/11/2024	Fieldwork Company Talk	HQ	Talk	In-person	1 day
22/01/2025	Solent Seascape Project - Seminar Series	Online	Talk	Online	1 day
30/01/2025	The Seagrass Consortium ‘Seagrass Hug’	Etang d'Berre, France	Talk	In-person	2 days
04/03/2025	Marine Citizen Science Week – Natural England, Natural Capital Accounting	Plymouth	Talk	In-person	1 day
27/03/2025	Quay Arts - An audience with Project Seagrass. ‘Restoring our marine meadows’	Newport, Isle of Wight	Talk	In-person	1 day
08/04/2025	ESRA2 Conference	Arcachon, France	Conference	In-person	4 days

Communication

To support delivery of outputs under Aim 3, *Secure the future of healthy seagrass at restoration sites and ensure a diverse range of people are engaged and benefit from the project*, a biannual *Solent Newsletter* was developed to communicate restoration and conservation activities within the Solent to a broad audience, including project stakeholders.

To date, four editions of the *Solent Newsletter* have been published (Figure 22). At the time of reporting, the subscriber base comprised 133 individuals, representing an increase from 129 subscribers recorded in July 2025. The fourth edition was distributed via the Mailchimp platform, enabling engagement metrics to be captured; analysis indicates that 42.9% of recipients opened and read the newsletter (Table 14).

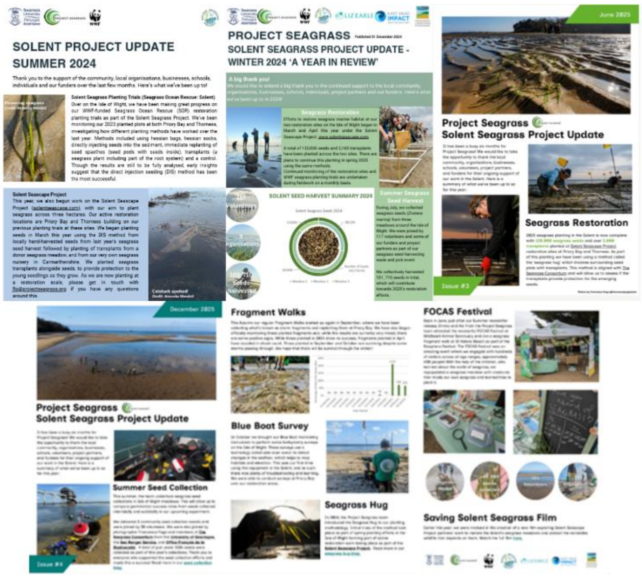

Figure 24. Issues of the Project Seagrass Solent newsletter.

Table 14. Newsletter statistics for the full project reporting period.

Newsletter edition	Date	Recipients	Open Rate	Number of readers
Issue #1	Jun-24	-	-	-
Issue #2	Dec-24	-	-	-
Issue #3	Jun-25	129	-	-
Issue #4	Dec-25	133	42.9	57

There have been 75 social media posts across multiple platforms associated with the Solent and Isle of Wight from 2022 to 2025 (Table 15).

Table 15. Solent Social Media Statistics for 2022-2025. 2024-2025 includes collaboration posts and reels

Year	Number of Posts and Reels
2022	5
2023	7
2024	33
2025	30
Total	63

Throughout the project, close collaboration was maintained with WWF partnership managers to develop and supply statistics and photographic materials to support national communications relating to the SOR Solent project. Strong professional working relationships were also sustained with key project partners, including Liz Earle, across the duration of the project. Several joint communications outputs were produced in connection with the Liz Earle partnership, particularly in relation to seagrass planting activities undertaken in March 2025.

The Liz Earle partnership further supported Project Seagrass through the delivery of three planting preparation workshops on the Isle of Wight for local volunteers, complemented by engagement with local corporate partners, including Mermaid Gin. Collectively, these communication and engagement outputs contribute directly to Deliverable 3.3: *Achieve long-term support for the restored seagrass from local stakeholders and communities*.

Knowledge Exchange and Advisory Groups

Project Seagrass remains to be at the forefront on advisory working groups in the Solent and Isle of Wight with additional national groups (Table 16). We meet regularly with Project partners Hampshire and Isle of Wight Wildlife Trust imparting knowledge exchange and advice.

Table 16. Advisory and Working Groups.

Workshop/Meeting Group	Occurs	Update type	Held by/Contact	Attendees
Community Engagement and Behavioural Change Workshop (CEBCW)		In-person	HIWWT	AM, FT
Solent Seagrass Restoration Working Group		In-person	Natural England	AM
Seascape Recovery Plan & Community Engagement WG's meeting	Every 2 months	In-person	Natural England	AM
Solent Seascape Technical Working Group	Monthly	In-person	Blue Marine Foundation	AM
Solent Forum		In-person	Solent Forum	Ricardo
Solent Seascape Finance WG	Monthly	In-person	Blue Marine Foundation	AM, RU
Solent Seascape Technical Meeting	Monthly	In-person	Blue Marine Foundation	AM, RU
Solent Seascape Core Meeting	Monthly	In-person	Blue Marine Foundation	AM, RU
WWF Meeting	Monthly	In-person	WWF	AM, BN, FT, JH, RU
Studland Bay Marine Partnership Meeting	Quaterly	In-person	National Trust/Dorset Council	AM
RESOW meeting (NOC, SU, PS, UoS)	Weekly	In-person	NOC	AM
Advanced Mooring Systems and Managing Access	Monthly	In-person	Natural England	FT, AM
HIWWT Meetings	Monthly	In-person	HIWWT/Project Seagrass	AM, BN, FT

The SOR Solent project has acted as a catalyst for attracting and securing additional funding and partnership opportunities, thereby supporting the continued implementation of seagrass conservation and protection measures beyond the lifespan of the SOR project.

Photo credits
1 | AMS installation - Kate Fortum,
2 | Active restoration - Francesca Page
3 | Quay Arts Exhibition - Anouska Mendzil
4 | Quay Arts Exhibition - Anouska Mendzil
5 | FOCAS and Biosphere Festival - Emma Butterworth
6 | FOCAS and Biosphere Festival - Emma Butterworth
7| WWF Chairs Challenge - Emma Butterworth

Figure 25. Key project event photographs

Conclusions

The Seagrass Ocean Rescue (SOR) Solent project, which ran from December 2022 to December 2025, was a resounding success that delivered exactly what it set out to do, achieving 100% of its workplan. By bringing together scientists, regulatory bodies, stakeholders, and local communities, the project successfully laid the groundwork for seascape-scale habitat recovery across the Solent and Isle of Wight. On the scientific front, the project's large-scale experimental trials provided crucial answers on how to best restore *Zostera marina* in the region. When it came to planting methods, using bare-root transplants proved to be the most effective approach. This method yielded the highest shoot densities and lengths, achieving an impressive 312% increase in shoot counts at the Thorness site. For seed-based restoration, Dispenser Injection Seeding (DIS) emerged as the top performer. The trials also highlighted the importance of location, revealing Thorness as the most viable site for seagrass expansion, while Beaulieu struggled due to high sediment transport and seabed instability. Furthermore, water quality assessments painted a clear picture of the region's environmental limits, indicating that harbour locations like Portsmouth and Langstone are highly eutrophic and generally unsuitable for resilient restoration. In contrast, areas outside these harbours offer the lower nutrient levels and higher light environments needed for long-term conservation. As a bonus, the project's scoping and UAV surveys successfully identified extensive seagrass meadows around the Isle of Wight that were previously completely unmapped.

Beyond the science, SOR Solent proved that real conservation requires strong community integration. Over the four-year reporting period, the project team managed to engage an estimated 9,298 individuals. This massive outreach effort included 61 community events, 25 talks, and specialized educational programs delivered directly to local schools. One of the most inspiring successes was the "Fragment Walk" initiative. This innovative program empowered local volunteers to collect and replant healthy seagrass fragments that had been uprooted and washed ashore by storms. The community's response was fantastic, and the biological results were equally promising, with some plots achieving survival rates of up to 211%. This initiative was so successful that it is now being adopted by other regional wildlife trusts.

Ultimately, the project's legacy extends far beyond its December 2025 end date. Recognizing that passive restoration is just as critical as active planting, the project successfully initiated the installation of Advanced Mooring Systems (AMS) at sites like Seaview and Priory Bay to protect both existing and newly planted meadows from recreational boating damage. To ensure these findings inform national policy, all spatial mapping data will be shared with Natural England to update the National Seagrass Layer. The project has also acted as a major catalyst for regional restoration, directly helping to secure further funding for initiatives like the Solent Seascape Project. Finally, to share these refined methodologies with the global scientific community, the findings of these experimental trials are slated for publication in an open-access, peer-reviewed journal.

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Appendix I: SOR Solent Planting Co-ordinates

Site	Plot code	Plot number	Method	Latitude	Longitude
Beaulieu	1A-1	1	Bags	50.78525	-1.37563
Beaulieu	1A-2	1	Bags	50.78516	-1.37563
Beaulieu	1A-3	1	Bags	50.78515	-1.37577
Beaulieu	1A-4	1	Bags	50.78524	-1.37577
Beaulieu	1B-1	13	Bags	50.78495	-1.37554
Beaulieu	1B-2	13	Bags	50.78486	-1.37555
Beaulieu	1B-3	13	Bags	50.78487	-1.37569
Beaulieu	1B-4	13	Bags	50.78495	-1.37567
Beaulieu	1C-1	4	Bags	50.78482	-1.3749
Beaulieu	1C-2	4	Bags	50.78473	-1.3749
Beaulieu	1C-3	4	Bags	50.78473	-1.37504
Beaulieu	1C-4	4	Bags	50.78482	-1.37505
Beaulieu	2A-1	21	Socks	50.78481	-1.37469
Beaulieu	2A-2	21	Socks	50.78472	-1.37468
Beaulieu	2A-3	21	Socks	50.78473	-1.37482
Beaulieu	2A-4	21	Socks	50.78481	-1.37482
Beaulieu	2B-1	6	Socks	50.78511	-1.37562
Beaulieu	2B-2	6	Socks	50.78502	-1.37562
Beaulieu	2B-3	6	Socks	50.78502	-1.37576
Beaulieu	2B-4	6	Socks	50.78511	-1.37576
Beaulieu	2C-1	16	Socks	50.78495	-1.3749
Beaulieu	2C-2	16	Socks	50.78486	-1.3749
Beaulieu	2C-3	16	Socks	50.78486	-1.37504
Beaulieu	2C-4	16	Socks	50.78495	-1.37505
Beaulieu	3A-1	7	DIS1	50.78458	-1.3753
Beaulieu	3A-2	7	DIS1	50.78449	-1.3753
Beaulieu	3A-3	7	DIS1	50.78449	-1.37543
Beaulieu	3A-4	7	DIS1	50.78458	-1.37544
Beaulieu	3B-1	10	DIS1	50.78482	-1.37555
Beaulieu	3B-2	10	DIS1	50.78473	-1.37555
Beaulieu	3B-3	10	DIS1	50.78473	-1.37569
Beaulieu	3B-4	10	DIS1	50.78482	-1.37569
Beaulieu	3C-1	11	DIS1	50.78479	-1.37594
Beaulieu	3C-2	11	DIS1	50.7847	-1.37593
Beaulieu	3C-3	11	DIS1	50.7847	-1.37607
Beaulieu	3C-4	11	DIS1	50.78479	-1.37607
Beaulieu	4A-1	15	Control	50.78495	-1.37513
Beaulieu	4A-2	15	Control	50.78486	-1.37512
Beaulieu	4A-3	15	Control	50.78486	-1.37526
Beaulieu	4A-4	15	Control	50.78495	-1.37527
Beaulieu	4B-1	17	Control	50.78495	-1.37469
Beaulieu	4B-2	17	Control	50.78486	-1.37468

Beaulieu	4B-3	17	Control	50.78487	-1.37482
Beaulieu	4B-4	17	Control	50.78496	-1.37482
Beaulieu	4C-1	12	Control	50.78495	-1.37575
Beaulieu	4C-2	12	Control	50.78486	-1.37575
Beaulieu	4C-3	12	Control	50.78487	-1.37589
Beaulieu	4C-4	12	Control	50.78496	-1.37589
Beaulieu	5A-1	3	Imm	50.78408	-1.37684
Beaulieu	5A-2	3	Imm	50.78397	-1.37684
Beaulieu	5A-3	3	Imm	50.78408	-1.37701
Beaulieu	5A-4	3	Imm	50.78399	-1.37701
Beaulieu	5B-1	9	Imm	50.7838	-1.37679
Beaulieu	5B-2	9	Imm	50.78371	-1.37677
Beaulieu	5B-3	9	Imm	50.7837	-1.37693
Beaulieu	5B-4	9	Imm	50.78379	-1.37692
Beaulieu	5C-1	20	Imm	50.78427	-1.37604
Beaulieu	5C-2	20	Imm	50.78436	-1.37606
Beaulieu	5C-3	20	Imm	50.78438	-1.37591
Beaulieu	5C-4	20	Imm	50.78429	-1.3759
Beaulieu	6A	5	TP	50.78403	-1.37594
Beaulieu	6B	2	TP	50.78386	-1.3763
Beaulieu	6C	14	TP	50.78393	-1.37646
Beaulieu	7A-1	8	Wild	50.78385	-1.37681
Beaulieu	7A-2	8	Wild	50.78384	-1.37667
Beaulieu	7A-3	8	Wild	50.78393	-1.37667
Beaulieu	7A-4	8	Wild	50.78394	-1.37681
Beaulieu	8A-1	18	DIS2	50.78436	-1.37613
Beaulieu	8A-2	18	DIS2	50.78427	-1.37611
Beaulieu	8A-3	18	DIS2	50.78426	-1.37626
Beaulieu	8A-4	18	DIS2	50.78434	-1.37627
Beaulieu	8B-1	22	DIS2	50.78409	-1.3766
Beaulieu	8B-2	22	DIS2	50.78399	-1.3766
Beaulieu	8B-3	22	DIS2	50.78409	-1.37675
Beaulieu	8B-4	22	DIS2	50.784	-1.37674
Beaulieu	8C-1	19	DIS2	50.78421	-1.37631
Beaulieu	8C-2	19	DIS2	50.78412	-1.37631
Beaulieu	8C-3	19	DIS2	50.78412	-1.37616
Beaulieu	8C-4	19	DIS2	50.78422	-1.37617
Beaulieu	HOBO	NA	HOBO	50.78485	-1.37545
Priory Bay	1A-1	1	Bags	50.70764	-1.10009
Priory Bay	1A-2	1	Bags	50.70765	-1.09994
Priory Bay	1A-3	1	Bags	50.70756	-1.09992
Priory Bay	1A-4	1	Bags	50.70755	-1.10006
Priory Bay	1B-1	13	Bags	50.70741	-1.09967
Priory Bay	1B-2	13	Bags	50.70743	-1.09952
Priory Bay	1B-3	13	Bags	50.70735	-1.0995
Priory Bay	1B-4	13	Bags	50.70732	-1.09964

Priory Bay	1C-1	4	Bags	50.70717	-1.09937
Priory Bay	1C-2	4	Bags	50.70719	-1.09924
Priory Bay	1C-3	4	Bags	50.7071	-1.09921
Priory Bay	1C-4	4	Bags	50.70708	-1.09934
Priory Bay	2A-1	21	Socks	50.70773	-1.1003
Priory Bay	2A-2	21	Socks	50.70773	-1.10015
Priory Bay	2A-3	21	Socks	50.70764	-1.10016
Priory Bay	2A-4	21	Socks	50.70764	-1.10028
Priory Bay	2B-1	6	Socks	50.70724	-1.09984
Priory Bay	2B-2	6	Socks	50.70726	-1.09969
Priory Bay	2B-3	6	Socks	50.70717	-1.09967
Priory Bay	2B-4	6	Socks	50.70717	-1.09982
Priory Bay	2C-1	16	Socks	50.70755	-1.09971
Priory Bay	2C-2	16	Socks	50.70757	-1.09957
Priory Bay	2C-3	16	Socks	50.70748	-1.09954
Priory Bay	2C-4	16	Socks	50.70746	-1.09968
Priory Bay	3A-1	7	DIS	50.70738	-1.10002
Priory Bay	3A-2	7	DIS	50.70737	-1.09987
Priory Bay	3A-3	7	DIS	50.70728	-1.09985
Priory Bay	3A-4	7	DIS	50.70727	-1.09999
Priory Bay	3B-1	10	DIS	50.70715	-1.09959
Priory Bay	3B-2	10	DIS	50.70716	-1.09945
Priory Bay	3B-3	10	DIS	50.70707	-1.09942
Priory Bay	3B-4	10	DIS	50.70706	-1.09955
Priory Bay	3C-1	11	DIS	50.7073	-1.09942
Priory Bay	3C-2	11	DIS	50.70733	-1.09929
Priory Bay	3C-3	11	DIS	50.70724	-1.09926
Priory Bay	3C-4	11	DIS	50.70721	-1.09939
Priory Bay	3D-1	NA	DIS	50.70743	-1.09947
Priory Bay	3D-2	NA	DIS	50.70745	-1.09934
Priory Bay	3D-3	NA	DIS	50.70736	-1.0993
Priory Bay	3D-4	NA	DIS	50.70734	-1.09944
Priory Bay	4A-1	15	Control	50.70751	-1.10005
Priory Bay	4A-2	15	Control	50.70751	-1.09991
Priory Bay	4A-3	15	Control	50.70743	-1.09989
Priory Bay	4A-4	15	Control	50.70742	-1.10003
Priory Bay	4B-1	17	Control	50.70727	-1.09962
Priory Bay	4B-2	17	Control	50.7073	-1.09948
Priory Bay	4B-3	17	Control	50.70721	-1.09946
Priory Bay	4B-4	17	Control	50.70719	-1.0996
Priory Bay	4C-1	12	Control	50.70768	-1.09975
Priory Bay	4C-2	12	Control	50.7077	-1.09962
Priory Bay	4C-3	12	Control	50.70762	-1.09959
Priory Bay	4C-4	12	Control	50.70759	-1.09972
Priory Bay	5A-1	3	Imm	50.70705	-1.09936
Priory Bay	5A-2	3	Imm	50.70706	-1.09922

Priory Bay	5A-3	3	Imm	50.70697	-1.09921
Priory Bay	5A-4	3	Imm	50.70696	-1.09935
Priory Bay	5B-1	9	Imm	50.70785	-1.10054
Priory Bay	5B-2	9	Imm	50.70787	-1.1004
Priory Bay	5B-3	9	Imm	50.70778	-1.10039
Priory Bay	5B-4	9	Imm	50.70777	-1.10053
Priory Bay	5C-1	20	Imm	50.70759	-1.09949
Priory Bay	5C-2	20	Imm	50.70761	-1.09935
Priory Bay	5C-3	20	Imm	50.70752	-1.09934
Priory Bay	5C-4	20	Imm	50.7075	-1.09948
Priory Bay	6A	5	TP	50.70708	-1.09612
Priory Bay	6B	2	TP	50.70697	-1.09575
Priory Bay	6C	14	TP	50.70708	-1.09548
Priory Bay	HOBO	NA	HOBO	50.70739	-1.09971
Thorness	1A-1	1	Bags	50.73526	-1.37575
Thorness	1A-2	1	Bags	50.73535	-1.37576
Thorness	1A-3	1	Bags	50.73535	-1.37561
Thorness	1A-4	1	Bags	50.73526	-1.37561
Thorness	1B-1	13	Bags	50.73529	-1.37491
Thorness	1B-2	13	Bags	50.73538	-1.37491
Thorness	1B-3	13	Bags	50.73541	-1.37478
Thorness	1B-4	13	Bags	50.73532	-1.37478
Thorness	1C-1	4	Bags	50.73529	-1.37554
Thorness	1C-2	4	Bags	50.73538	-1.37558
Thorness	1C-3	4	Bags	50.73539	-1.37543
Thorness	1C-4	4	Bags	50.7353	-1.37539
Thorness	2A-1	21	Socks	50.73544	-1.37495
Thorness	2A-2	21	Socks	50.73553	-1.37498
Thorness	2A-3	21	Socks	50.73554	-1.37483
Thorness	2A-4	21	Socks	50.73545	-1.37481
Thorness	2B-1	6	Socks	50.7354	-1.37595
Thorness	2B-2	6	Socks	50.73551	-1.37595
Thorness	2B-3	6	Socks	50.73552	-1.3758
Thorness	2B-4	6	Socks	50.73542	-1.3758
Thorness	2C-1	16	Socks	50.73533	-1.37471
Thorness	2C-2	16	Socks	50.73541	-1.37473
Thorness	2C-3	16	Socks	50.73543	-1.37458
Thorness	2C-4	16	Socks	50.73534	-1.37457
Thorness	3A-1	7	DIS	50.73526	-1.37594
Thorness	3A-2	7	DIS	50.73537	-1.37596
Thorness	3A-3	7	DIS	50.73534	-1.37582
Thorness	3A-4	7	DIS	50.73526	-1.37581
Thorness	3B-1	10	DIS	50.73523	-1.37528
Thorness	3B-2	10	DIS	50.73532	-1.37531
Thorness	3B-3	10	DIS	50.73532	-1.37517
Thorness	3B-4	10	DIS	50.73524	-1.37514

Thorness	4A-1	15	Control	50.73546	-1.37474
Thorness	4A-2	15	Control	50.73555	-1.37475
Thorness	4A-3	15	Control	50.73557	-1.37459
Thorness	4A-4	15	Control	50.73548	-1.37459
Thorness	4B-1	17	Control	50.7354	-1.37515
Thorness	4B-2	17	Control	50.7355	-1.37517
Thorness	4B-3	17	Control	50.73553	-1.37503
Thorness	4B-4	17	Control	50.73543	-1.37501
Thorness	4C-1	12	Control	50.73525	-1.37511
Thorness	4C-2	12	Control	50.73534	-1.37511
Thorness	4C-3	12	Control	50.73536	-1.37495
Thorness	4C-4	12	Control	50.73526	-1.37496
Thorness	5A-1	3	Imm	50.73476	-1.37857
Thorness	5A-2	3	Imm	50.73485	-1.37859
Thorness	5A-3	3	Imm	50.73486	-1.37845
Thorness	5A-4	3	Imm	50.73477	-1.37842
Thorness	5B-1	9	Imm	50.73478	-1.37835
Thorness	5B-2	9	Imm	50.73487	-1.37836
Thorness	5B-3	9	Imm	50.73487	-1.37822
Thorness	5B-4	9	Imm	50.73478	-1.37821
Thorness	5C-1	20	Imm	50.73479	-1.37814
Thorness	5C-2		Imm	50.73487	-1.37815
Thorness	5C-4		Imm	50.73481	-1.37801
Thorness	5C-3		Imm	50.7349	-1.37801
Thorness	6A	5	TP	50.73502	-1.37821
Thorness	6B	2	TP	50.73506	-1.378
Thorness	6C	14	TP	50.73515	-1.37727
Thorness	HOBO	7	HOBO	50.73537	-1.37533

Appendix II: Weymouth Harbour drop-down survey data

Table shows the raw data collected from drop-down surveys onboard RV Calypso at Weymouth Harbour on 15/05/2023.

Transect No	GPS ID No	Coordinate	Coordinate	Seagrass (present/absent)	Seagrass % cover	Comments
1	545	50.61005	2.44569	Absent	0	Not recording
1	546	50.61014	2.44547	Absent	0	Recording
1	547	50.61021	2.44527	Absent	0	00:01:38
1	548	50.61034	2.44502	Absent	0	00:02:15
1	549	50.61045	2.44481	Present	5	00:03:06
2	550	50.61036	2.44466	Present	15	Not recording
2	551	50.6102	2.44496	Present	5	00:00:36
2	552	50.61008	2.44519	Present	80	00:01:30
2	553	50.60998	2.44541	Absent	0	00:02:29
2	554	50.60994	2.44552	Absent	0	00:02:58
3	555	50.60988	2.44543	Absent	0	00:00:21
3	556	50.60996	2.44523	Absent	0	00:00:53
3	557	50.61008	2.4449	Present	100	00:02:22
3	558	50.61015	2.44466	Present	5	00:03:25
3	559	50.61027	2.4444	Absent	0	00:04:09
4	560	50.61027	2.44455	Present	5	00:01:20
4	562	50.61009	2.44474	Present	70	00:02:52
4	563	50.60997	2.44497	Present	70	00:04:42
4	564	50.60988	2.44528	Absent	0	00:05:35
4	565	50.60979	2.44537	Absent	0	00:06:09
5	566	50.60973	2.44523	Present	20	00:00:19
5	567	50.60979	2.44499	Present	40	00:00:48
5	568	50.60991	2.44491	Present	100	00:02:10
5	569	50.61002	2.44463	Present	100	00:03:00
5	570	50.61014	2.44423	Absent	0	00:04:10
6	571	50.61013	2.44426	Absent	0	00:00:10
6	572	50.60995	2.44455	Present	100	00:00:58
6	573	50.60986	2.44477	Present	100	00:02:17
6	574	50.60973	2.44496	Present	100	00:03:06
6	575	50.60965	2.44512	Present	70	00:03:42
7	576	50.6096	2.44499	Present	100	00:00:16
7	577	50.60963	2.44481	Present	100	00:00:58
7	578	50.60971	2.44457	Present	100	00:03:01
7	579	50.60986	2.4444	Present	100	00:03:40

7	580	50.60999	2.44405	Present	100	00:04:40
8	581	50.61007	2.44378	Present	75	00:00:38
8	582	50.60995	2.44403	Present	100	00:01:38
8	583	50.6098	2.44431	Present	100	00:02:20
8	584	50.60967	2.44455	Present	100	00:08:20
8	585	50.60957	2.44466	Present	100	00:03:57
9	586	50.6099	2.4438	Present	100	
9	587	50.60991	2.44373	Present	5	
9	588	50.61	2.44373	Present	100	
9	589	50.61034	2.44616	Present	100	
9	590	50.61053	2.44617	Absent	0	
Random points	591	50.61053	2.44617	Absent	0	
Random points	592	50.61066	2.44605	Absent	0	
Random points	593	50.61086	2.4458	Absent	0	
Random points	594	50.61104	2.44555	Absent	0	

Appendix III: Post-hoc Tukey results

A | Tukey post-hoc results for seagrass shoot count (all seagrass planting methods)

$Site

	diff	lwr	upr	p adj
PB-B	1.319574	0.5084525	2.130696	0.0004054
TH-B	2.819567	1.9661544	3.672979	0.0000000
TH-PB	1.499993	0.7357571	2.264228	0.0000127

$Method

	diff	lwr	upr	p adj
Control-Bags	0.33821692	-1.2358756	1.9123094	0.9901749
DIS-Bags	2.09321553	0.7882221	3.3982090	0.0000718
IMM-Bags	0.04133746	-1.3195568	1.4022318	0.9999993
Socks-Bags	0.13710532	-1.2398834	1.5140941	0.9997533
TP-Bags	8.15794311	6.7351718	9.5807144	0.0000000
DIS-Control	1.75499861	0.2811042	3.2288930	0.0090449
IMM-Control	-0.29687946	-1.8204903	1.2267314	0.9937520
Socks-Control	-0.20111160	-1.7391151	1.3368919	0.9990670
TP-Control	7.81972619	6.2406014	9.3988510	0.0000000
IMM-DIS	-2.05187807	-3.2955141	-0.8082420	0.0000384
Socks-DIS	-1.95611021	-3.2173379	-0.6948825	0.0001448
TP-DIS	6.06472758	4.7536686	7.3757866	0.0000000
Socks-IMM	0.09576786	-1.2232169	1.4147526	0.9999481
TP-IMM	8.11660565	6.7498939	9.4833174	0.0000000
TP-Socks	8.02083779	6.6380993	9.4035763	0.0000000

B | Tukey post-hoc results for seagrass shoot count (without seagrass transplant methods)

$Site

	diff	lwr	upr	p adj
PB-B	1.533240093	0.9832271	2.0832531	0.0000000
TH-B	0.003695402	-0.5612084	0.5685992	0.9998704
TH-PB	-1.529544691	-2.0412906	-1.0177988	0.0000000

$Method

	diff	lwr	upr	p adj
Control-Bags	-0.36109432	-1.2930150	0.5708264	0.8283675
DIS-Bags	1.31637683	0.5437727	2.0889810	0.0000334
IMM-Bags	-0.25617129	-1.0618708	0.5495282	0.9087959
Socks-Bags	-0.23369796	-1.0489260	0.5815301	0.9358481
DIS-Control	1.67747115	0.8048714	2.5500709	0.0000016
IMM-Control	0.10492302	-0.7971107	1.0069567	0.9978061
Socks-Control	0.12739635	-0.7831583	1.0379510	0.9955024
IMM-DIS	-1.57254812	-2.3088264	-0.8362698	0.0000001
Socks-DIS	-1.55007479	-2.2967680	-0.8033816	0.0000002
Socks-IMM	0.02247333	-0.7584142	0.8033609	0.9999914

C | Tukey post-hoc results for seagrass shoot height

$Site

	diff	lwr	upr	p adj
PB-B	0.5480895	0.2832744	0.8129046	3.7e-06
TH-B	1.6185786	1.3353980	1.9017592	0.0e+00
TH-PB	1.0704891	0.8156804	1.3252978	0.0e+00

$Method

	diff	lwr	upr	p adj
Control-Bags	0.11078778	-0.41256220	0.63413776	0.9908249
DIS-Bags	0.60089067	0.16257676	1.03920458	0.0013175
IMM-Bags	-0.04915167	-0.50336852	0.40506518	0.9996290
Socks-Bags	0.11563506	-0.34454549	0.57581561	0.9800445
TP-Bags	5.49733948	5.01979535	5.97488361	0.0000000
DIS-Control	0.49010289	0.00636436	0.97384142	0.0449483
IMM-Control	-0.15993945	-0.65813302	0.33825412	0.9427979
Socks-Control	0.00484728	-0.49878952	0.50848408	1.0000000
TP-Control	5.38655170	4.86700162	5.90610177	0.0000000
IMM-DIS	-0.65004234	-1.05798928	-0.24209540	0.0000827
Socks-DIS	-0.48525561	-0.89983238	-0.07067884	0.0110249
TP-DIS	4.89644881	4.46267911	5.33021851	0.0000000
Socks-IMM	0.16478673	-0.26656900	0.59614246	0.8860097
TP-IMM	5.54649115	5.09665782	5.99632448	0.0000000
TP-Socks	5.38170442	4.92585004	5.83755880	0.0000000

Appendix IIII: SOR Solent Reports

List of reports produced as part of the SOR Solent Project

Reporting Period	**Reporting Period**	**Report Title**	**Author**
June 2021	N/A	Solent *Zostera marina* Health & Reproductive Surveys: June 2021	Evie Furness, Richard Unsworth
May 2022	N/A	AN ASSESSMENT OF SEAGRASS (ZOSTERAMARINA) HEALTH IN SOUTH ENGLANDINRELATIONTO WATER QUALITY NUTRIENTS	Emma Fox, Richard Unsworth
January 2022	April – December 2021	SOR Technical Report & Workplan	Richard Unsworth
July 2022	January – July 2022	SOR Technical Report & Workplan	Evie Furness
July 2023	January – July 2023	SOR Technical Report & Workplan	Richard Unsworth, Katy Waring, Anouska Mendzil
January 2024	July – December 2023	SOR Technical Report & Workplan	Anouska Mendzil, Richard Unsworth
July 2024	January – July 2024	SOR Technical Report & Workplan	Anouska Mendzil, Richard Unsworth
January 2025	July – December 2024	SOR Technical Report & Workplan	Anouska Mendzil, Richard Unsworth
July 2025	January – July 2025	SOR Technical Report & Workplan	Anouska Mendzil
January 2026	2022 - 2025	SOR End of Project Report	Anouska Mendzil, Emma Butterworth