SEAWILDING
Community-led Marine Habitat Restoration
Scottish Charity No: SC050126

Seagrass Report 2025

Summary

2025 has been another cracking year for our seagrass restoration project. After four years of trialing different restoration methodologies, with mixed success, we now have conclusive proof that the translocation of seagrass shoots can lead to the rapid growth of seagrass meadows.

Seagrass is the ocean's only flowering plant and plays a vital role in supporting marine biodiversity as well as being an important carbon sink, yet it has been disappearing at an alarming rate since the 1900s. Efforts to restore seagrass are dogged by failure, but Seawilding's new methodology is showing unprecedented success.

For the last 10 years, efforts around the UK have focused on restoring seagrass habitat mainly by sowing seagrass seeds. Yet success has been limited, with few examples of widespread seagrass habitat becoming established. Since 2024, Seawilding has been trialing a new approach, transplanting tens of thousands of adult shoots from existing seagrass "donor" meadows to remarkable effect.

Since July 2024, a newly planted area saw an increase in seabed coverage from 10% to more than 70% in just 15 months, while in 2025 a new trial achieved 97% survival of transplanted seagrass shoots and an average four-fold increase in seabed coverage in just 6 months. Altogether this has resulted in an area of 0.3 hectares of newly created seagrass habitat. Crucially, the impact of shoot extraction from the existing donor meadow is negligible. Even when harvested at 25% across a trial plot, in just 5 months shoot density was back to near-natural levels.

Two of our trial sites, one in Loch Beag and one within the sand-cap trial area, sadly didn't establish successfully. While this wasn't the outcome we had hoped for, setbacks like these are an important part of the restoration journey. We now have a better idea of why these sites failed (explained in more detail below), and each trial has provided valuable lessons to take forward. We'll continue to test new areas and refine our techniques, learning as we go, and, we hope, building towards long-term success along the way.

As you will read in this annual report, the ground-breaking results are a first for seagrass restoration in the UK, and on the back of this success, in 2026, Seawilding will expand beyond Loch Craignish to trial seagrass restoration at other sites on the West coast of Scotland.

Once again in 2025, we were joined by scores of volunteers, academics and interested parties keen to see practical seagrass restoration at work, and the award of a "Gold" for our collaborative seagrass garden at the Royal Horticultural Society's Chelsea Flower Show helped amplify our work and our key message that marine habitat protection and restoration is critical to restoring ocean health. You can read more about the show and the award in our Outreach Report 2025.

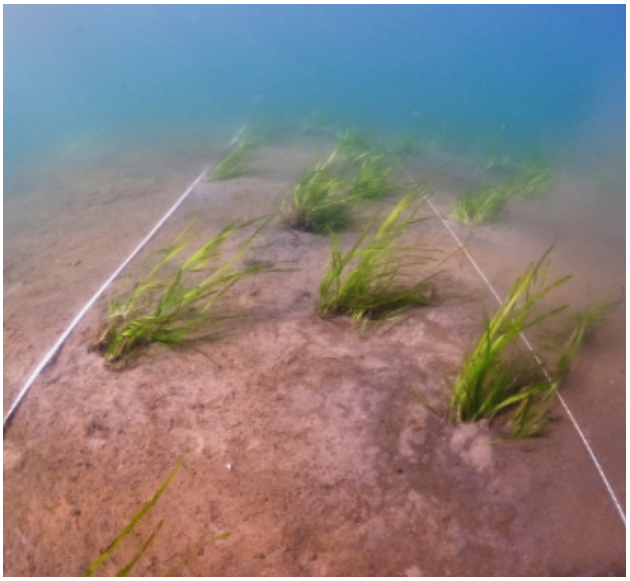
We hope you find this account of our seagrass restoration in 2025 informative and fulfilling.

Transplant success in Loch Craignish

Our approach

Seawilding has been trialing seagrass restoration in Loch Craignish since 2021. Initial trials involved harvesting seeds and planting them in small hessian bags on the seabed.

Despite multiple attempts at different seed planting techniques, success was elusive and in 2023 we shifted to transplanting adult seagrass shoots from nearby natural meadows. After initial problems with site selection, we began full transplant trials in 2024 on the sandy seabed of Dunvullaig Bay beside an existing meadow.



Shoots are collected by hand using SCUBA divers or snorkelers, taking less than 1% of shoots per m^2 from donor areas. They're then brought to our boathouse where volunteers separate individual shoots, attach steel washers to give purchase on the seabed and gather them into bundles of 5 or 10 plants. Within hours, the shoots are replanted in the restoration area.

In June 2024, we planted a trial area of 485 m^2 at a density of 2 bundles of 10 shoots per m^2. Following promising results from this trial, in spring and summer 2025 we scaled up our planting to 0.28 ha, resulting in over 1/3 hectare of newly established seagrass meadow in Loch Craignish.

Included in the 2025 transplanting were a number of trials aimed at improving efficiency. These comprised reducing planting density from 2 to 1 bundle per m^2, reducing shoot numbers to 5 plants per bundle, and simplifying shore-based shoot processing techniques.

Block no.	Planting method	Dimensions (m)
1 - 4	2024 shoot trials	
5	Seed density trial	10 x 10
6	Shoots: 200 bundles of 10	10 x 20
7	Shoots: 200 x bundles of 5	10 x 20
8	Shoots: 100 x bundles of 10	10 x 10
9	Shoots: 100 x bundles of 10	10 x 10
10	Shoots: 200 x bundles of 5	10 x 20
11	Shoots: 100 x bundles of 10	10 x 10
12	Shoots: 100 x bundles of 10	10 x 10
13	Shoots: 200 x bundles of 5	10 x 20
14	Shoots: 100 x bundles of 10	10 x 10
15	Shoots: 100 x bundles of 10	10 x 10
16	Shoots: 100 x bundles of 5	10 x 20
17	Shoots: 100 x bundles of 10	10 x 10
18	Shoots: 100 x bundles of 10	10 x 10
19	Shoots: 200 x bundles of 5	10 x 20
20	Shoots: 100 x bundles of 10	10 x 10
21	Shoots: 200 x bundles of 5	10 x 20
22	Shoots: 200 x bundles of 5	10 x 20
Infill	Shoots: 200 x bundles of 5	Area: 200m²

Monitoring

In September 2025 we carried out monitoring to assess the results from both 2024/25 transplanting trials. In the 2025 plots we looked at:

- Bundle survival: The number of surviving bundles were counted along 3 out of 10 planting ‘lines’ per plot (i.e. 30 bundles checked across a plot of 100).
- Bundle expansion across the seafloor: A 0.25 m^2 quadrat was used to measure percentage seabed cover for 6 randomly selected bundles per plot.
- Shoot numbers: The number of shoots per bundle were counted for 6 randomly selected bundles per plot.

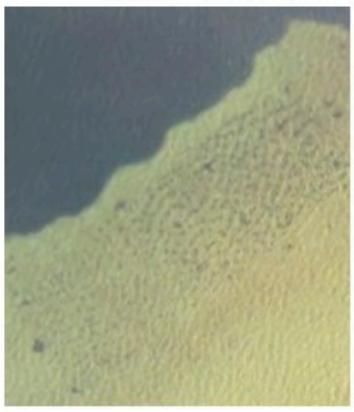
It was necessary to adjust our monitoring method for the 2024 trial plots as we could no longer identify individual bundles. Instead, we used an approach we usually employ for surveying natural meadows, looking at:

- Overall percentage cover along a 10 m transect.
- Total shoot count and percentage cover across 3 x 0.25 m^2 quadrats per transect, at set distances.

2024 Trial Results

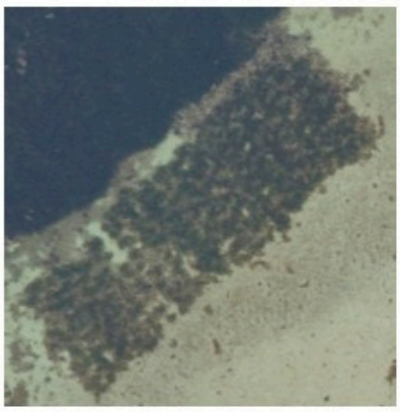
In September 2025, we carried out six 10m transects and eighteen 0.25 m^2 quadrats across the 485 m^2 2024 trial site. Average habitat cover recorded along the transects was 79%, while quadrats (n=18) showed 73.7 ± 23% cover and an average of 385 ± 170 shoots per m^2.

For reference, initial planting densities in June/July 2024 were 2 bundles of 10 shoots per m^2 with < 5% cover and the adjacent natural meadow showed nearly 100% cover and shoot densities of 528 ± 206 per m^2 over the same period (n=27 quadrats).



July 2024

September 2024



August 2025

2025 transplant plots

Across the 2025 transplant plots, we recorded an average bundle survival rate of 96.6% per line (n=900). Average bundle coverage within quadrats across all plots was 33 ± 24.4% (n=120), with a mean shoot count of 28 ± 20.7 per bundle, representing an average 333% increase in shoots per bundle. The highest growth observed was from a bundle planted in March 2025 at 10 shoots and ~5% cover which increased to 95% cover and 120 shoots by September 2025.

We also examined planting time effects in 2025. Plots were transplanted from 28 March to 13 August, with most planting blocks in May and June. By September 2025, earlier planting blocks showed greater expansion and higher shoot numbers, though later blocks (e.g. August) may yet catch up. This year we will be testing earlier planting in February to see whether the viable window for planting can be extended even earlier.

Bundle size trials

We also tested bundle size (5 vs 10 shoots) and reduced planting density from 2 bundles per m^2 to 1. Based on initial results, bundles of five seem to perform just as well as larger bundles, allowing us to increase efficiency by planting the same number of shoots over a larger area. These results may be specific to the environment in Dunvullaig Bay, but they provide a strong starting point. Over the coming years, we will be monitoring the effects of reduced planting density on the time it takes for the planting blocks to infill.

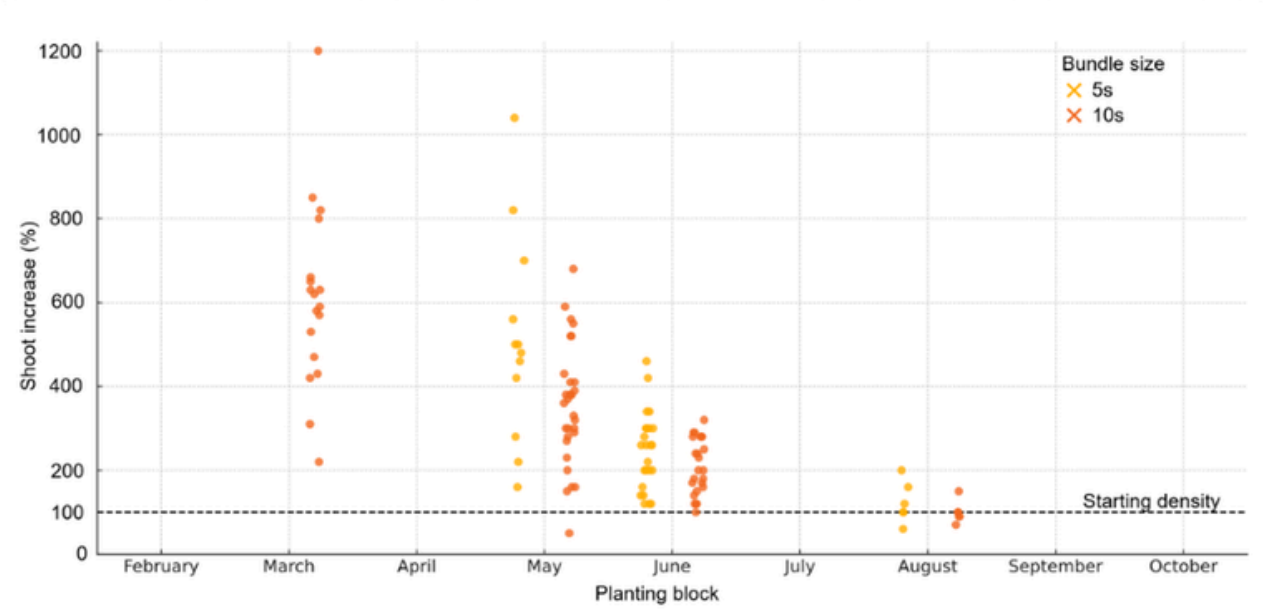
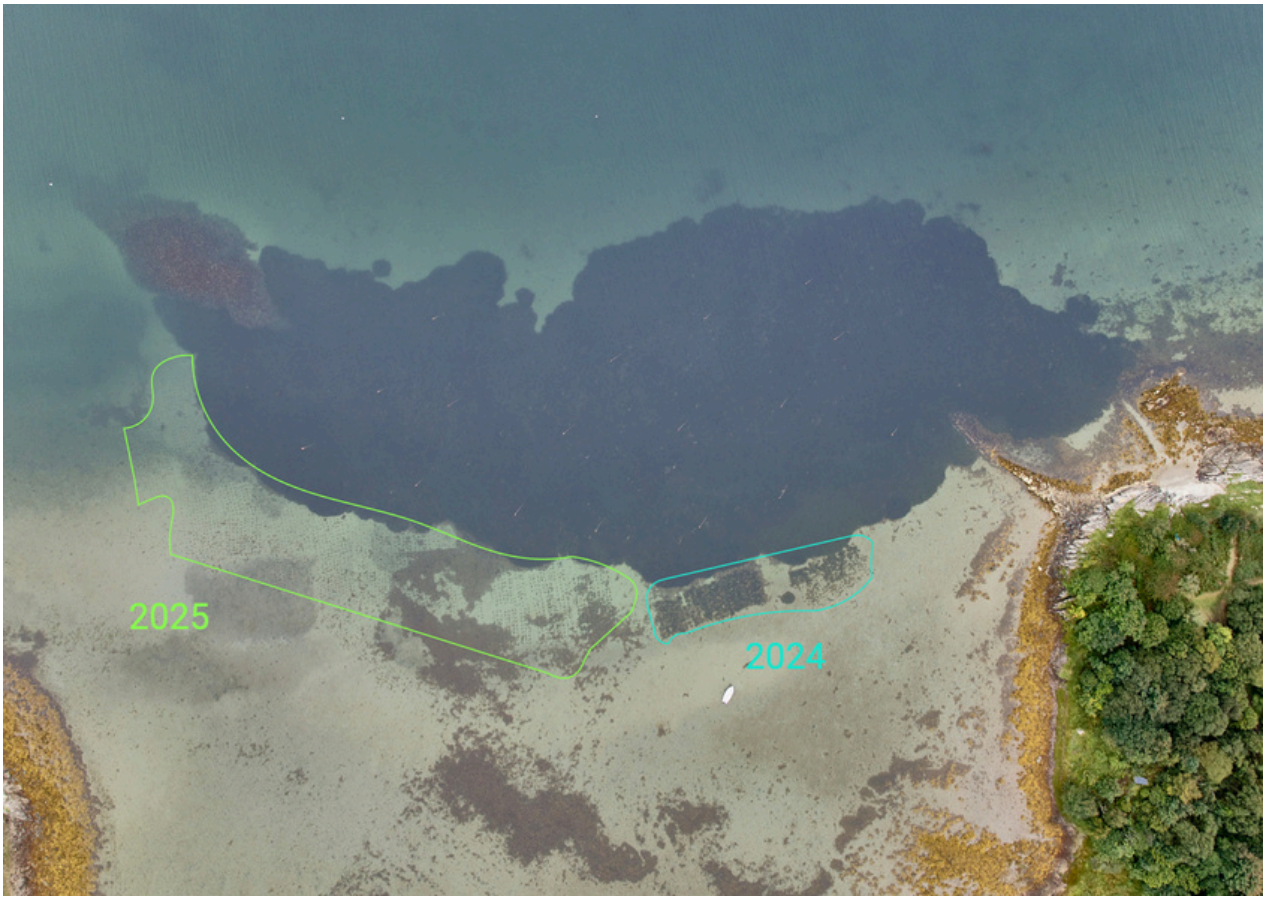


Figure 1. Percentage shoot increase per bundle from the starting amount for the 2025 planting blocks (March to August). Bundle size is indicated by colour (yellow for 5s, red for 10s). Bundle size data for each month are parted for clarity here, but were planted simultaneously during the month.



Seagrass Restoration Area, 2025

Impact Monitoring

We are always conscious that harvesting live plants for transplanting could harm existing meadows. To address this, we established a monitoring plan to understand how our donor meadow responds to different levels of harvesting intensity.

We set up six test stations across the Dunvullaig meadow. At each station, three 1 m² plots were designated: one control plot (0% harvested), one with 25% of shoots removed, and one with 50% removed. The plots were harvested in May 2025, and shoot counts were recorded immediately afterward. We returned in September to recount shoots in each plot and compare recovery rates across the different harvesting intensities.

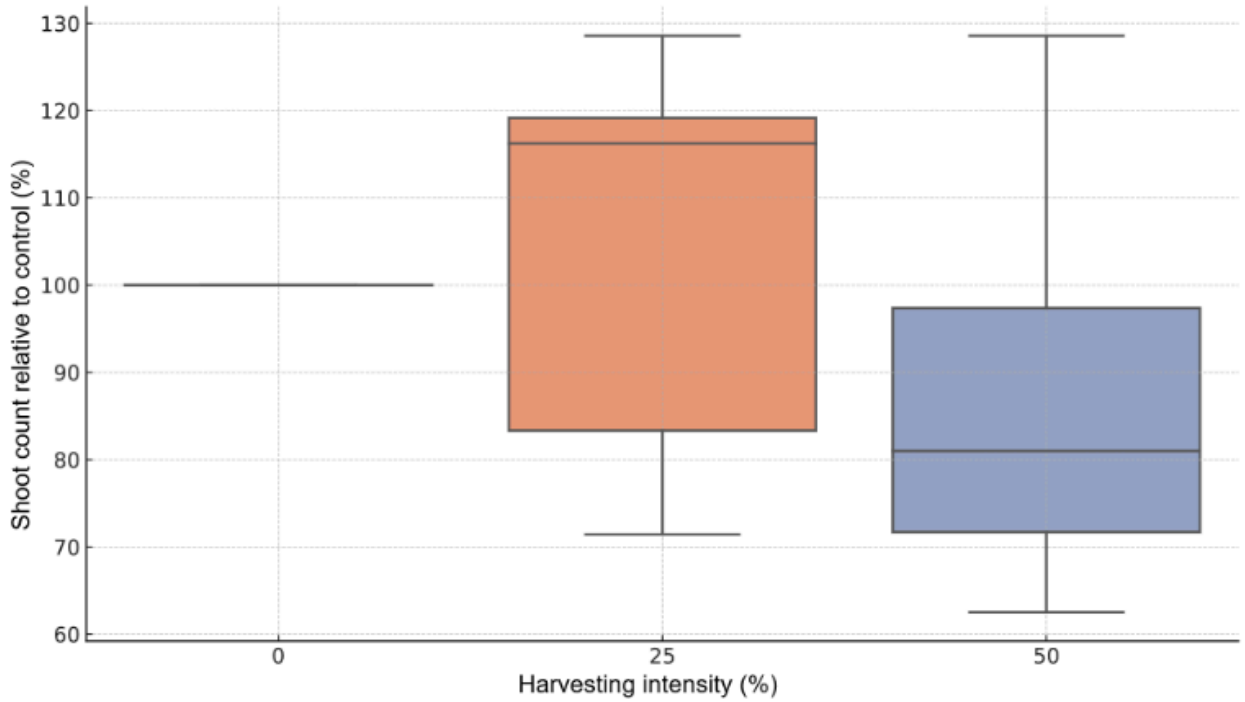


Figure 2. Shoot counts as a percentage relative to the adjacent 0% control plot in September 2025 for the 25% and 50% harvesting intensity plots (n=6).

The results after just four months were promising. The plot above shows relative recovery rates compared to the 0% control plots. Where 25% of shoots were harvested in May, shoot density and cover had recovered to equal or slightly above nearby controls by September. The 50% plots showed slower recovery, though their average rate of shoot increase was the highest. The impact of 50% harvesting was still visible in September, but we also observed many smaller, younger shoots in these plots.

We will continue monitoring these plots throughout 2026. Tracking recovery following shoot collection is essential and should be included in any project using donor meadows. In practice, our harvesting intensity is currently less than 1%, giving us confidence that our transplanting method is sustainable and not harming existing meadows. The results of this impact monitoring may allow us to increase harvesting intensity in the future as we scale up seagrass restoration using the transplanting method.

Loch Beag, and lessons learnt

A next step for us in developing methods to enable active restoration of seagrass in Scotland is testing whether the transplant methods used successfully in Dunvullaig Bay can enable the establishment of meadows in locations where seagrass habitat has been completely lost, or where coverage is limited and recovery needs a helping hand. To this end, in May 2025, we established two restoration test sites away from existing seagrass habitat, using the transplant approach. The first of these was in Loch Beag, a small sea loch located on the western side of the Craignish peninsula, the second is described later in this report, alongside the sandcapping trials. We chose Loch Beag as there is anecdotal evidence from local residents that seagrass was once present in Loch Beag, but was lost in a major storm event. This has been backed up by analysis of sediment cores by SAMS which showed strong signals of seagrass eDNA in sediment layers, suggesting past seagrass presence. All this, as well as some habitat suitability modelling undertaken by SAMS, suggested that the site was a good fit for restoration. A swim-over of the site in February 2025 helped to confirm this, showing bright, clear waters, and soft unvegetated sediment across most of the seabed of the loch.

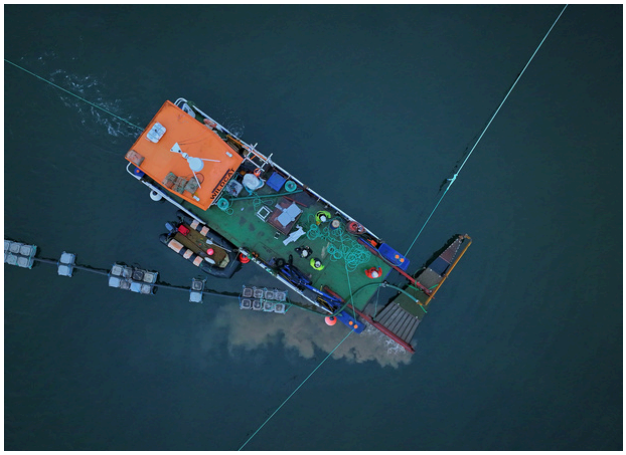
On May 8th 2025 we transplanted around 700 plants from our donor meadow in Loch Craignish to a small trial plot in Loch Baeg. Plants were transplanted to a 5 m x 5 m area, in bundles of 10 shoots, with steel washers attached for weight and chemical buffering.

We checked up on the site a number of times throughout the summer. Sadly, by September, all plants had died on the trial plot, with only small amounts of rotting rhizome and washers left to tell the tale. The first thing we noticed in September was that huge amounts of seaweed (bootlace) were entangled around the our marker poles, and had built up in great rotting piles directly over the seagrass. When we removed the seaweed, we found large areas of anoxic seabed, with bacterial mats and blackened sediment where we had transplanted the plants. Notably, many of the washers that we pulled up showed little signs of rust, another indication of anoxic conditions. Observing the wider area we could see that certain depressions in the seabed acted as traps for detrital macroalgae, and that the anoxic sediments that had killed off our plants were present elsewhere in the loch too.

While this outcome was not what we had hoped for, results like this are fundamental to restoration science. Each trial is a learning process, and helps us refine our approach, improve site selection, and better understand the complex conditions that seagrass needs to thrive. In this case, a full set of seasonal observations of the loch might have tipped us off to the macroalgal build ups. Closer inspection of the sediment might also have shown the risk of anoxic conditions here. It’s also taught us that using poles to mark out sites may not always be the best approach when they can act as entanglement traps.

The trial at Loch Beag has shown us though that the trial transplant approach works as a strategy. Although in this case unsuccessful, the trial has given us an immediate answer and a number of useful learning points going forward, all within a short time-frame and at the cost of 800 rhizomes (from which the donor meadow recovers very quickly post-extraction). We are still confident that Loch Beag will work, and we have a number of sites, away from the anoxic depressions, where we are hoping to trial more transplants in the loch in 2026.

Van Oord



In 2024/25 we partnered with a Dutch marine construction company, Van Oord, which "sand-capped" 1,000 m^2 of seabed in the Craignish lagoon. This involved depositing a 10cm layer of sand on the seabed in an effort to counteract the anoxic (oxygen-depleted) conditions in the existing sediment. This anoxic mud contains high levels of sulphides which is toxic to seagrass. In the spring, 100,000 seagrass seeds were planted into the sand with the hope this new substrate would improve growing conditions. Sadly, while Van Oord learned much about the process of seagrass restoration at scale, and while a few seedlings were recorded, none lasted the summer.

Alongside Van Oord's seed-based restoration trials, we also carried out a small-scale seagrass transplant trial within the sand-capped area. While the results were disappointing, the trial has provided valuable insights that will help shape our future restoration efforts.

In May 2025, we transplanted 600 seagrass rhizomes from our donor meadow at Dunvullaig to the sand-capping site. The rhizomes were planted in bundles of 10, at a density of 2 bundles per m, to give them the best possible chance of establishing. The site, like the rest of the sand-capped area, had been covered with an approximately 10 cm layer of medium-to-coarse sand imported from a land-based quarry. The transplant area was located at an average depth of 1m below MLW and was exposed to relatively strong tidal flows.

Initially, the transplants appeared to be settling in. When we returned to the site in mid-July, the majority of the transplants were still present, although signs of stress were already visible, including epiphyte build-up on the leaves. Unfortunately, by the time of our next visit, in October, the majority of the transplanted seagrass had not survived, with only a few small plants remaining.

Early analysis by Van Oord suggests that high water turbidity and low light levels at the seabed may have played a significant role in the failure of the transplants. These same factors may also help explain the limited success of the seed-based trials at this location. A more detailed analysis is currently being prepared to better understand the conditions at the site and what this means for future restoration work.

Seagrass Restoration Plans 2026

Based on the success we have seen in Loch Craignish, we are now keen to trial the seagrass shoot transplanting methodology in other locations on the west coast of Scotland. To this end, throughout the Autumn the team investigated a number of sites in the Argyll and Bute region with a range of environmental parameters including exposure, depth, and sediment type to assess their potential for transplanting trials in 2026.

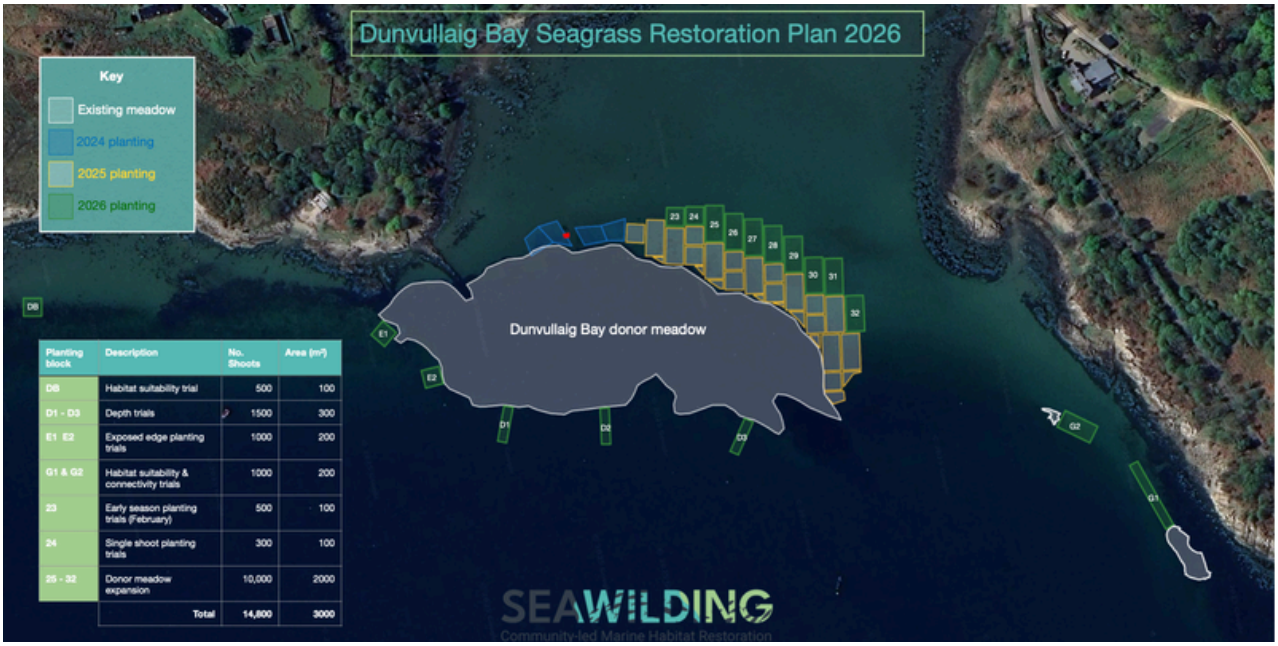
These trials will see 500 plants translocated from Loch Craignish to each site, alongside 500 plants sourced from meadows adjacent to the sites and are designed to investigate the applicability of the shoot transplanting method in a range of environmental conditions, answering key questions about the future of seagrass restoration at scale. Crucially, we will be involving local communities in the trials at each site in the hope of inspiring people to engage with the marine environment on their doorstep and potentially take the lead in furthering seagrass restoration in their area should trials prove successful.

As we continue to explore new sites, we are also contributing to seagrass mapping across the region, helping to build a clearer picture of their health and extent. This year alone, we mapped an additional 0.35 hectares of seagrass across 10 meadows in Argyll and Bute and in May 2026, the team will be surveying unmapped seagrass meadows in Tiree. This data will be submitted to national databases, ensuring it contributes to wider conservation efforts.

We will also be continuing with transplanting trials in Loch Craignish in 2026 to investigate:

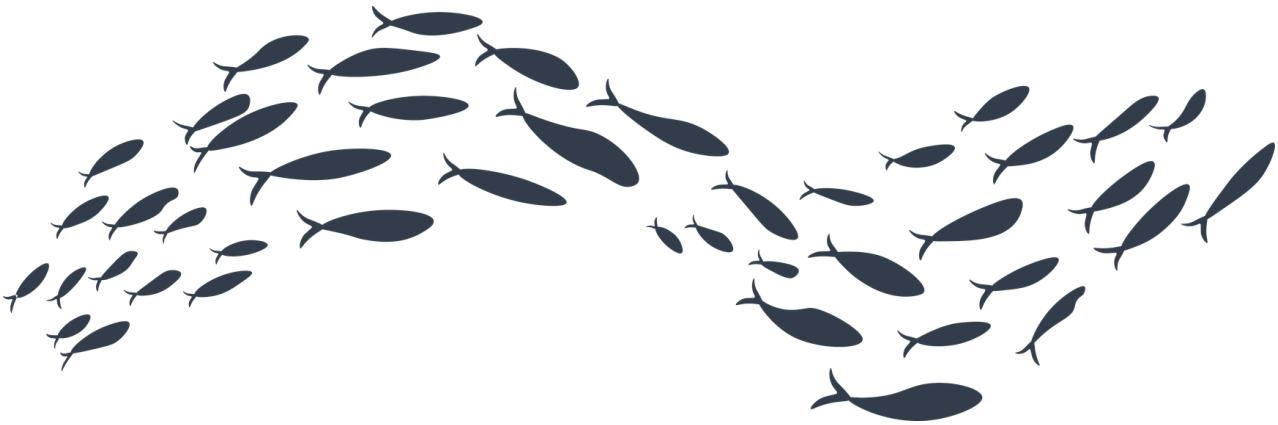
- Further improvements in efficiency of shore-based shoot processing.
- Pre-spring transplanting trials with the aim of further extending the restoration season.
- Planting in more exposed and deeper areas at our Loch Craignish trial site.
- Seagrass habitat suitability and connectivity trials at other sites within Loch Craignish.
- Further transplanting trials at Loch Beag

If all trials are successful, our 2026 transplanting activities in Loch Craignish will create a further 0.3 hectares of new seagrass habitat, all the while expanding the Dunvullaig Bay donor meadow, allowing for increased harvesting as we scale up restoration efforts on the west coast of Scotland in the future.



Planting block	Description	No. Shoots	Area (m²)
D8	Habitat suitability trial	500	100
D1 - D3	Depth trials	1500	300
E1 E2	Exposed edge planting trials	1000	200
G1 & G2	Habitat suitability & connectivity trials	1000	200
23	Early season planting trials (February)	500	100
24	Single shoot planting trials	300	100
25 - 32	Donor meadow expansion	10,000	2000
	Total	14,800	3000

In 2026, in response to demand for practical training and more knowledge sharing from other community groups around the UK, Seawilding will be piloting a “Restoration School” running relevant courses in the spring and late summer. The courses, which are in development, are likely to cover snorkel qualifications, underwater surveying, seagrass harvesting and planting, underwater photography and aspects of native oyster restoration.



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