



Team ZOSTERA

Casco Bay's Seagrass Stewards

Fowlers Beach, Long Island: Proposed Half-Acre Eelgrass Restoration Pilot for 2026

COBALT/Team Zostera proposes a fall 2026 seed-based infill pilot covering approximately one-half acre of shallow, bare or sparsely vegetated patches within the College Rocks/Fowlers Beach eelgrass meadow on Long Island. The adjacent, more productive portion of this same meadow is one of our 2026 seed donor, or “mother,” meadows. Returning seeds to carefully selected gaps would test whether added seed density can help maintain and strengthen a meadow that may remain an important donor over the long term.

The site offers a focused test of a practical restoration question. Long Island observers report that gaps in the shallower meadow appear to have grown over roughly the past decade; the available imagery and surveys should be compared before treating the rate or cause of change as established. Existing eelgrass nearby shows that parts of this setting support *Zostera marina*, but it does not prove that the gaps have adequate light, stable sediment, or suitable conditions for seedlings. The pilot will test whether targeted seed addition improves establishment and persistence in those gaps while examining other possible constraints.

We collected approximately 27,000 reproductive shoots across five donor meadows in 2026. The number of viable seeds will be determined after processing at Bowdoin College's Schiller Coastal Studies Center (SCSC), planned for October 15–18 in close collaboration with the many partners at SCSC. Judging from past years and current seed holding conditions, preliminary estimate is on the order of 300,000 seeds, with considerable uncertainty as to the final number. Subject to viability, final site assessment, permissions, and plot design, we propose placing 100% of the seeds processed (roughly 200 seeds per square meter) across one-half acre. The actual treatment density will be specified once viable seed numbers have been determined.

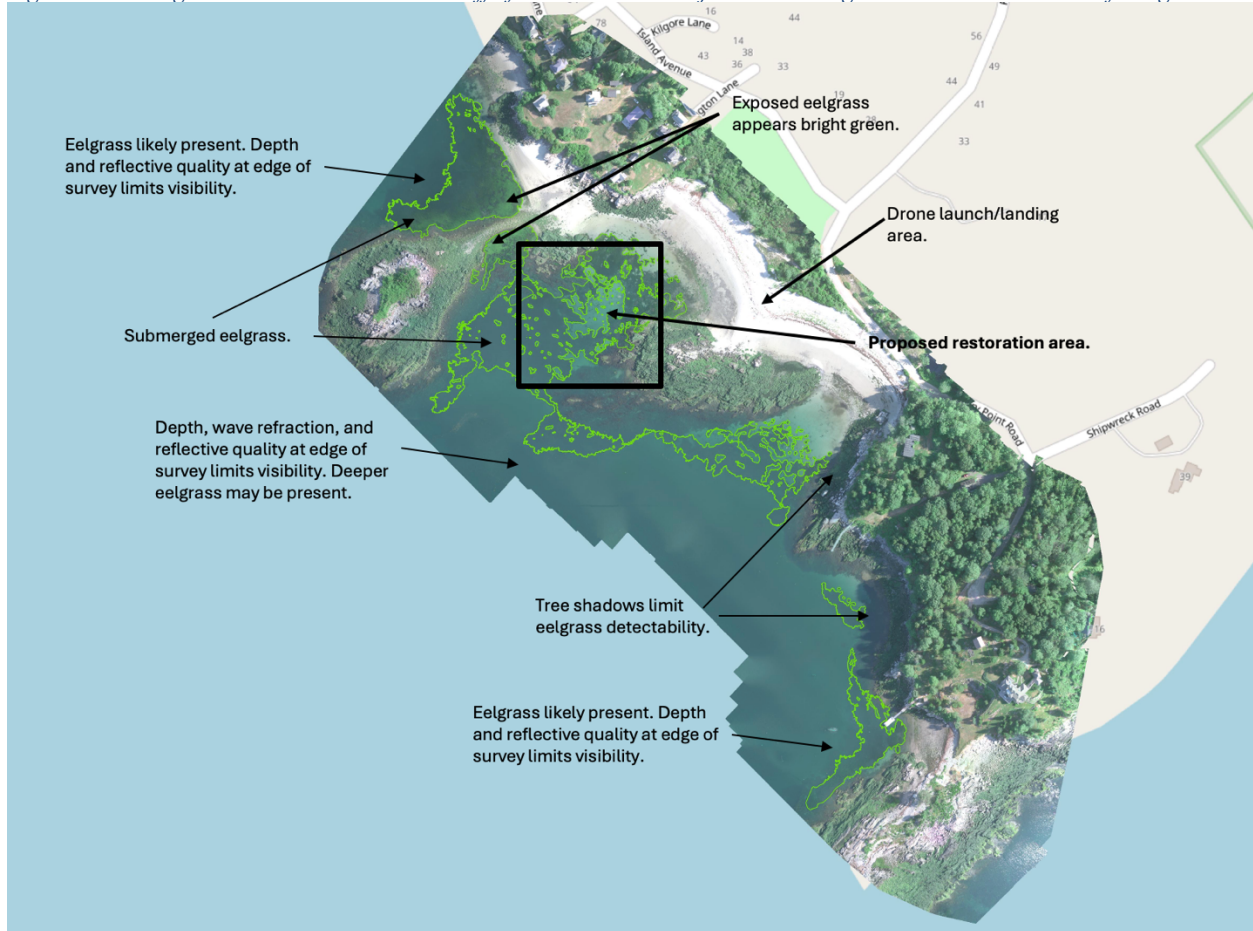
This pilot builds on Team Zostera's Cousins/Little John work: seeds deployed in fall 2024 germinated and produced seedlings in 2025, but only a handful of shoots remained by summer 2026. The central question is therefore whether seedlings survive and expand after germination. A bounded, monitored infill trial at Fowlers Beach can examine seed supply alongside light, sediment movement, temperature, water quality, hydrodynamics, disturbance, donor provenance, and seed or sediment microbes. Its findings can inform the separate one-acre restoration trial identified for 2027. See site map below.



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Figure 1: The target Restoration site is located off of Fowler's Beach adjacent to College Rocks on the West End of Long Island



Implications for RAE Grant Requirements

The QAPP identifies a one-acre restoration trial in 2027, while the RAE agreement does not require a 2026 pilot. We propose the half-acre Fowlers Beach work as a learning step to refine site selection, seed handling, deployment, and monitoring before that larger trial. The primary treatment would place measured quantities of viable seed in plots within verified gaps. A small set of comparable unseeded reference plots would help distinguish treatment effects from natural recolonization. Hand-casting with a light covering of nearby sediment is a proposed method to assess during final design and in-field activity. Key questions are:

- **Primary:** Does targeted seed addition increase seedling establishment, first-summer persistence, and subsequent shoot density in shallow meadow gaps compared with unseeded reference plots?



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- **Secondary:** Where seed quantities allow, do separately tracked donor sources differ in establishment and persistence under comparable conditions?
- **Exploratory/explanatory:** Which measured conditions, including sediment, light, water quality, genetics, microbiome, and seed pathogens, help explain differences among plots?

The final design that we will develop on October 18, 2026 will specify the half acre footprint, seeded and reference plot locations, source allocation, seed density, marking method, survey dates, and partners involved. It will also identify which measures are required for the primary outcome and which remain exploratory, so the pilot is feasible with the available seed and field capacity.



Figure 2: Underwater view of the target restoration site – photo was taken in the middle of the gap identified above in figure 2. Photo Taken on September 18, 2026.

Why College Rocks/Fowlers Beach?

The proposed treatment area lies in shallower gaps associated with an established meadow; it is distinct from the deeper, productive portions used for seed collection. This arrangement makes a targeted infill test possible without presenting the entire donor meadow as degraded. The gaps are visible in field and aerial imagery, while residents and site partners have observed apparent expansion over about ten years. A georeferenced comparison of historical imagery, the 2022 DEP survey, and the July 2026 drone survey would establish whether and where the gap area has changed. Our 2026 reproductive survey also identified College Rocks/Fowlers as a strong donor site: its preliminary seed-potential index was second among five surveyed meadows. This makes protecting



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the meadow's future reproductive capacity a meaningful objective, although successful infill and increased future seed production must be measured rather than assumed.



Fowler Beach – Proposed Restoration Areas

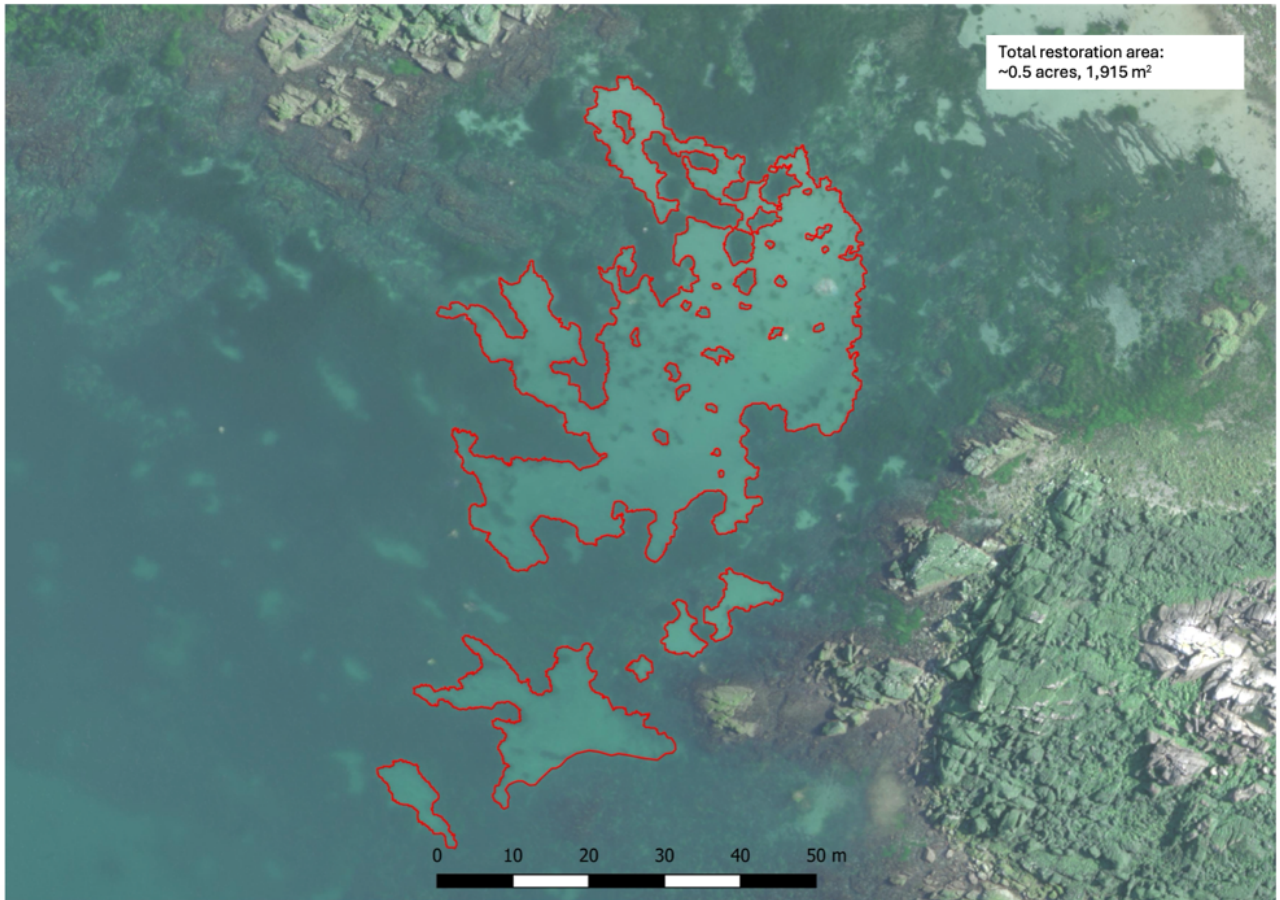


Figure 3: Target Restoration site delineated from aerial drone photography captured on July 17, 2026

On July 17, 2026, Nearview LLC conducted a drone survey using a DJI Matrice 200 V2 and MicaSense RedEdge-MX Dual sensor (10 spectral bands, 444–842 nm), with a downwelling light sensor and calibrated reflectance panels. Stefan Claesson served as Remote Pilot in Command. Flights were timed near low tide. Pix4Dmapper 4.10.1 produced 10-band surface-reflectance orthomosaics georeferenced to NAD83(2011)/UTM zone 19N (EPSG 6348) using five Propeller AeroPoints per site. These data support the baseline mapping shown in Figures 1 and 4, subject to field checks of submerged patch boundaries.



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Existing evidence and remaining site checks

The 2026 drone imagery provides a spatial baseline; Team Zostera also has reproductive-shoot and phenology observations from the donor meadow. Continuous BlueSonde measurements of temperature, salinity, turbidity, chlorophyll, and dissolved oxygen provide environmental context. Together with permanent diver plots, these records can support a repeat 2027 survey of seedling survival and change in cover. Before deployment, the team should verify gap boundaries, depth and light conditions, substrate stability, nearby shoots, potential disturbance, and safe access during the intended tide and season. A repeat drone survey alone cannot attribute any observed change to seeding; the plot comparison and field observations are essential.

The September 18 reconnaissance found predominantly sandy sediment with modest amount of fines and shell fragments, scattered vegetative shoots, and adjacent eelgrass. No obvious scour, mooring impact, or other persistent disturbance was noted during that visit. These observations support further assessment, but they cannot rule out seasonal stress (particularly winter ice accumulation, seed loss due to predators such as green crabs, or unfavorable conditions for seedlings. Final plot selection will exclude locations with identifiable ongoing disturbance and document comparable conditions in seeded and reference plots.

Connecting biology to the environment

At College Rocks/Fowlers Beach, continuous monitoring provides field context for reproduction and harvest timing

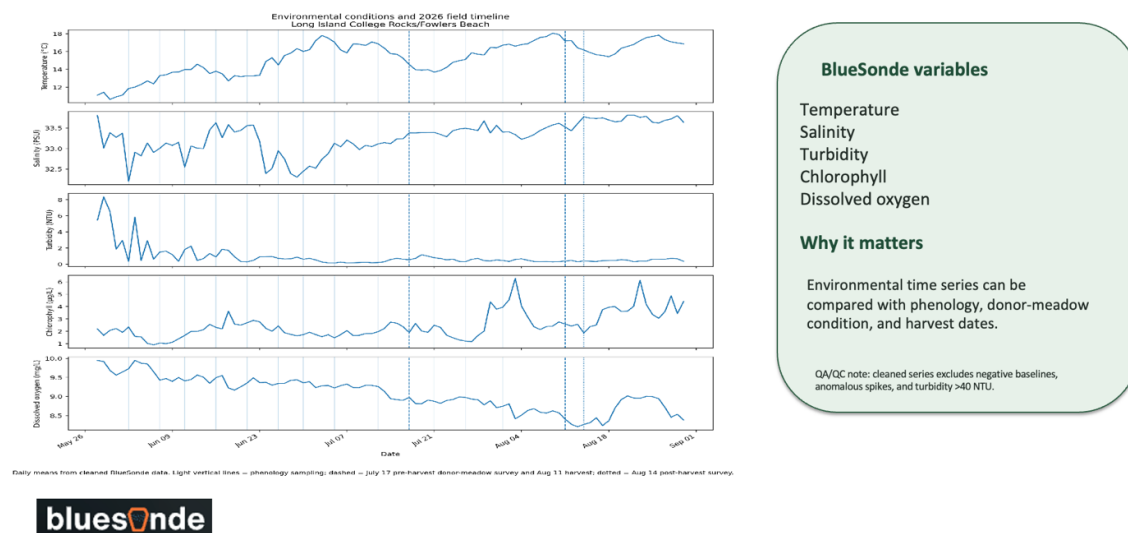


Figure 4: Continuous Water Quality Monitoring Data at this site in partnership with Bluesonde.



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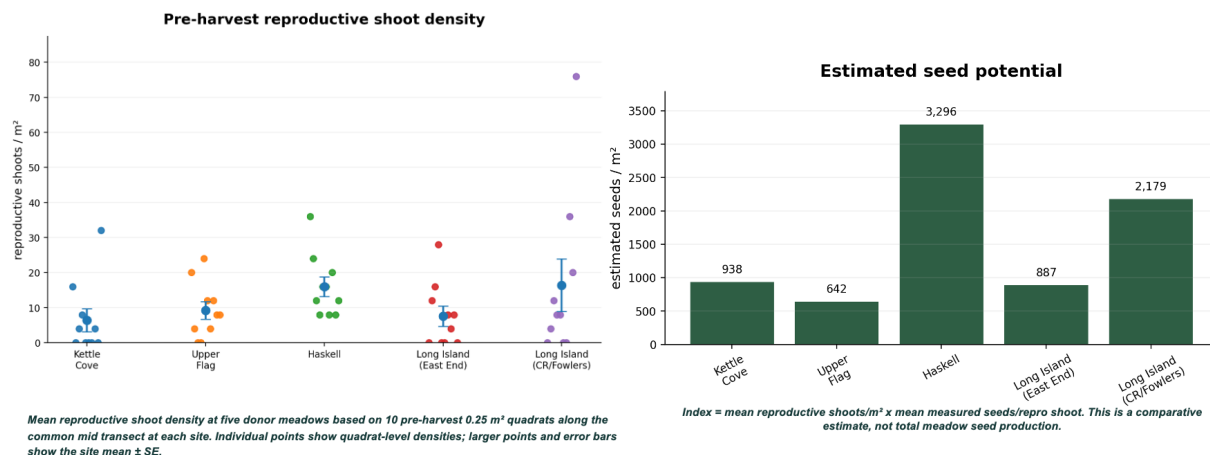
Experimental design and measures of success

The strongest design we are imagining would retain donor-source identity where practical rather than mixing all seed into one undifferentiated batch. Seeds from Haskell, Upper Flag, Kettle Cove, Long Island East End, and College Rocks/Fowlers could be assigned across distinct plots if each source has sufficient viable seed. A limited source comparison is secondary to the main seeded-versus-reference comparison and should not dilute treatment density below a useful level. COBALT's genetics collaboration with Dr. Cynthia Hays and Keene State College may later help interpret source differences, but a small field pilot cannot by itself establish a genetic cause. Record seed counts and viability by source, deployment density, plot conditions, and any losses during processing or placement.

Figure 5: Estimated Seed Potential in four donor or "mother" meadows with high reproductive output in the deeper meadows off Fowler's Beach.

Donor meadows differ in reproductive potential

Moving beyond "how many shoots?" toward what those shoots may contribute to restoration



Microbiome and Seed Health Questions

The gap next to an established meadow also allows an exploratory comparison of sediment microbial communities in vegetated and bare areas. Adjacent plants may influence the gap sediment, but that remains a hypothesis. If sampling capacity permits, Dr. Geoff Zahn and his students from the College of William and Mary have expressed interest in contributing to this analysis by



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collaborating on an experimental design that would begin to identify microbial assemblage in sediment where there is existing eelgrass, seeded gaps, unseeded gaps, and nearby unvegetated reference areas after germination. The sampling plan would likely be conducted in Spring/Summer 2027.

COBALT's seed pathogen work with Dr. Hamish Small at VIMS offers another potential explanatory layer. Screening seeds from approximately five donor meadows for oomycete pathogens can inform seed handling and interpretation of poor establishment. Microbial and pathogen results should be analyzed alongside measured field outcomes; association alone would not demonstrate that a particular organism caused success or failure.

A wider research network is adding layers of resilience

Thermal stress	Dr. Maya Groner, Dr. Reyn Yoshioka, and Bigelow partner experiments	How do populations respond to elevated temperature?
Genetics	Dr. Cynthia Hays / Keene State	How diverse and connected are donor meadows?
Seed-associated microbes	Dr. Hamish Small / VIMS	Which organisms occur with reproductive material?
Microbiome	Dr. Geoff Zahn / William & Mary + Microbiome CoP	How might plant/sediment microbiomes relate to meadow condition?
Remote sensing	Nearview / Stefan Claesson	How can aerial mapping connect extent with diver observations and identify healthy meadows, reproductive status, and more?
Field and lab support	Bowdoin College Schiller Coastal Studies Center	Vessel support, lab facilities, internship opportunities, and partner data

The goal is not a collection of separate studies - it is a Living Atlas that connects meadow condition, environment, reproduction, genetics, microbes, stress, spatial patterns, and restoration outcomes.

Figure 7: Wider COBALT Research Network of engaged partners and their institutions to assist with understanding restoration outcomes.

We intend to document field-deployed seed to help better understand bottlenecks related to in-situ seed germination. We plan to use 100% of the seeds processed due to lack of capacity for overwintering.



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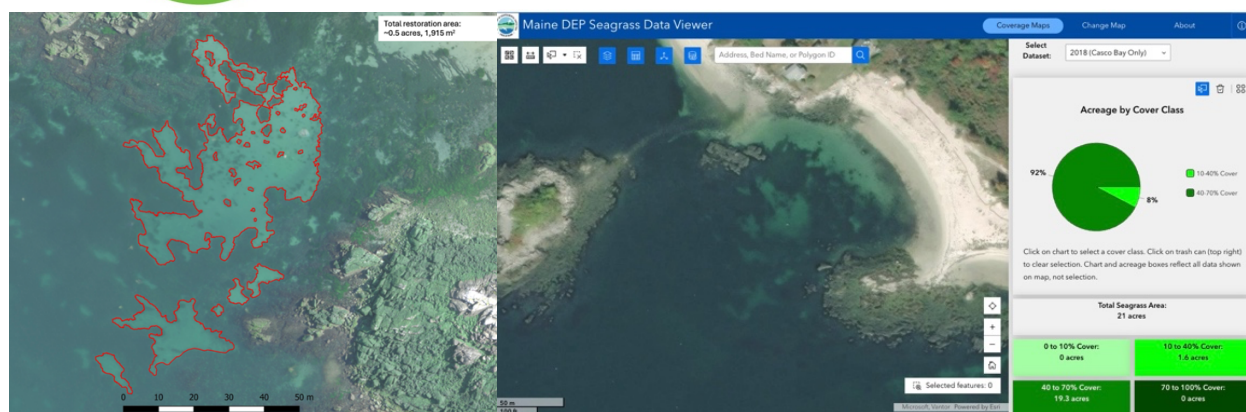


Figure 8: Comparison of Gap from 2018 data and 2026 drone footage. The image on the left illustrates the current extent of the gap at peak low tide in July 2026. Dark patches on both sides of the visible gaps were confirmed as eelgrass on September 18, 2026. The DEP Seagrass Data Viewer image on the right is from aerials taken in 2018 which illustrates a far more dense meadow with far smaller gaps. Since there were gaps that have become much larger – the restoration project attempts to close the gaps with seed-based restoration, but also to better understand the dynamics that may be causing the expansion of the gaps in recent years.

A Long Island Living Laboratory with Community Partners

Fowlers Beach has an unusually strong public dimension for a restoration pilot. Public access makes the site easier for Long Island residents (many of whom have been active community volunteers with COBALT/Team Zoster involved in phenology, seed collection, spathe removal and seed processing) to observe and document conditions throughout the winter. The Long Island Civic Association (LICA) and Oceanside Conservation Trust of Casco Bay (OCT) have an established presence in the area, including a dune restoration effort led by LICA and adjacent land protection efforts led by OCT. We are also working with the Long Island Historical Society to better understand historical extent of seagrass meadows and the value of this ecosystem to the people of the place. COBALT will continue to coordinate outreach and share public-facing materials with the three organizations, continue to engage with relevant land and marine authorities, and the wider Casco Bay Island community, to raise awareness of treatment plots and the work of understanding outcomes of the pilot restoration effort. The pilot should be judged by more than seeds deployed or spring germination. Its staged measures are seed retention where measurable, germination, seedling establishment, first-summer persistence, overwinter survival, second-year shoot density, and eventual spread and reproductive contribution. Permanent seeded and unseeded plots, georeferenced photographs, diver counts, and repeat imagery can track these outcomes against the 2026 baseline.



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Conclusion

We recommend College Rocks/Fowlers Beach as the leading candidate for an approximately half-acre fall 2026 infill pilot, pending the final site checks, viable seed count, acknowledgement from partners and local stakeholders which will lead to a final experimental design completed after seeds are processed. The aim is to learn whether strategic seed addition can close shallow gaps and add density to a productive potential long-term donor meadow, while producing evidence that improves restoration decisions elsewhere in Casco Bay and builds community engagement.



Figure 9: Underwater view of the target restoration site – photo was taken in the middle of the gap identified above in figure 8 at the bottom of the image. Photo Taken on September 18, 2026.