LIS Eelgrass Collaborative 2026 Workshop

May 19, 2026

Held at the Cornell Cooperative Extension of Suffolk County Facility

The LIS Eelgrass Collaborative is funded by the Long Island Sound Partnership and facilitated by the CT National Estuarine Research Reserve

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Background

The Long Island Sound (LIS) Eelgrass Collaborative formed in 2023 as a Connecticut-New York bi-state initiative to implement elements of the 2022 Eelgrass Management and Restoration Strategy. The Strategy provides guidance for short and long-term actions that should be taken to manage and restore eelgrass meadows in LIS and acts as a resource for other estuaries in the region facing similar issues.

The Collaborative is comprised of participants from academic, NGO, industry, and federal and state agency staff. Meetings are funded by the Long Island Sound Partnership and facilitated by the CT National Estuarine Research Reserve since the Reserve encompass 53% of Connecticut's existing eelgrass beds and 37% of Long Island Sound and Fishers Island Sound's (New York plus Connecticut) eelgrass beds. The Collaborative has four meetings a year, with three being virtual and one hosted in-person each year, including this May 19, 2026 workshop. The agenda can be found in Appendix A and the list of 52 workshop registrants can be found in Appendix B.

Workshop Overview

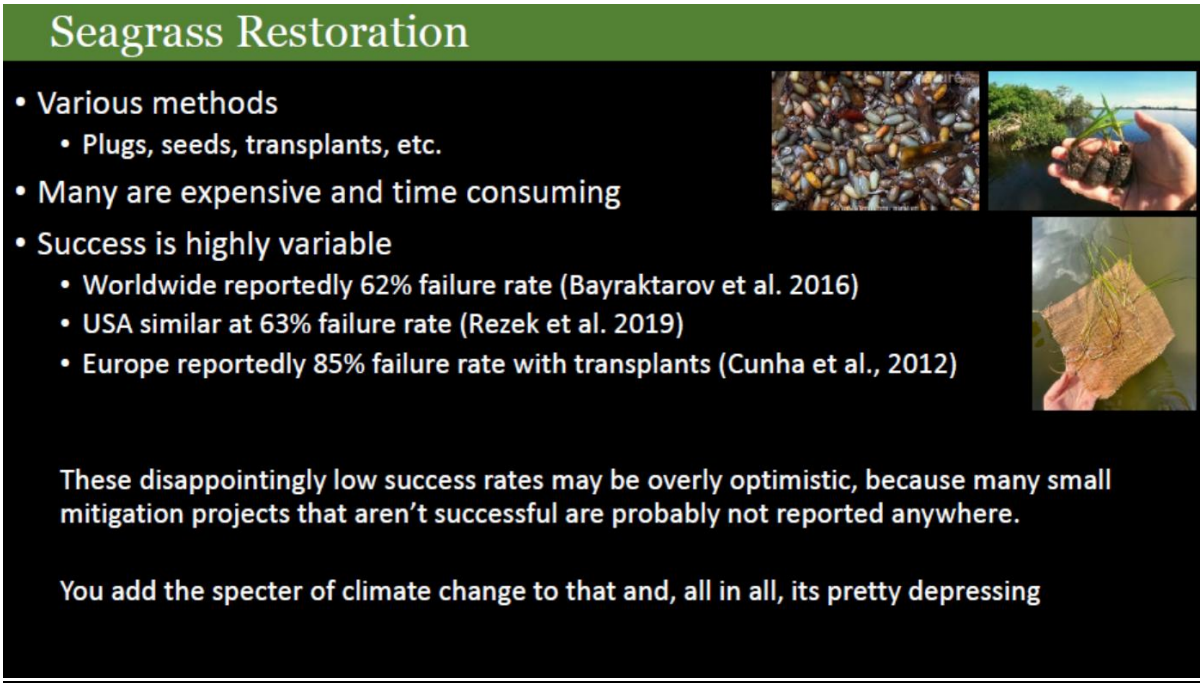
The goal of the 2026 workshop was to advance seed based restoration by hearing from a keynote speaker, having breakout discussions, and looking at equipment used for restoration at the Cornell Cooperative Extension (CCE) Facility on Long Island. Chris Patrick, Associate Professor from the Virginia Institute of Marine Science started the day by explaining his research team's eight step approach to restoration. Steve Schott from CCE followed with a description of a newly released draft of Best Management Practices. After these two presentations, workshop participants divided into two groups for an indoor and outdoor rotation at the CCE facility. The outdoor group viewed recent facility upgrades and discussed equipment options and setup used for restoration. The indoor group divided into three breakout sessions with a focus on: 1) small group discussion with Chris Patrick, 2) CCE equipment demonstrations, and 3) providing input on three research topics prioritized by the Collaborative. A summary of these workshop sessions follows.

Speaker: Chris Patrick - Associate Professor, Virginia Institute of Marine Science (VIMS)

Presentation Title: How To do Seed-Based Restoration in 8 Easy Steps

PLEASE NOTE:

- Assessment and harvesting timeframes indicated in the slides below are based on VIMS schedule and will differ for Northeast sites.
- Slide screenshots are included to supplement this summary. To access slides, **CLICK HERE)**.



STEP 1 – Check donor meadows frequently in spring to assess which beds are the most productive.

1) Check the Meadows

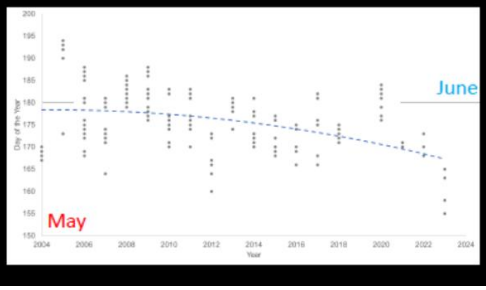
We visit multiple potential donor meadows to assess variation in shoot density and seed stage

Looking for Chartreuse Branching shoots (*"if it ain't Chartreuse, it ain't no use"*)

1) Check the Meadows

- Timing is critical (we think?) !
- Here, we visit beds frequently through April and May to identify which donor beds are most productive that year and to time collections based on seed status
- Too early "might" (we're investigating) lead to larger proportion of non-viable seeds
- A day or two too late can result in missing the harvest

Clark et al. 2021



Harvest date is trending earlier each year, climate change effect.

STEP 2 – Harvest reproductive shoots from the wild by hand, preferably using trained staff.

2) Harvest Seeds from the Wild

- VIMS Staff from the SAV Restoration & Monitoring Program as well as volunteers organized by TNC collect eelgrass flowering shoots by hand
- Snorkeling or SCUBA

- Collection usually in May
- Multiple collecting trips in a season (3 to 5 water days with 6 to 12 people)
- Laundry bags for reproductive shoots
- 30k to 90k back end "good" seeds per person per hour

2) Harvest Seeds from the Wild

- Reproductive shoots with seeds transported to SAV Program at VIMS

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- Reproductive shoots with seeds transported to SAV Program at VIMS

STEP 3 – Process collected material**.** Collect volumetric measurements and hold shoots in outdoor flow-through tanks for 6-8 weeks until only fine particulates and good seeds after fluming and sieving.

3) Process them in the "lab"

- Reproductive shoots are "fluffed" volumetrically measured into 55-gallon allotments using large trash cans
- Several bags per can but number varies due to variation in how tightly filled the bags are

3) Process them in the "lab"

- We aim for 6 or 7 cans per circular water tank at our facility
- Tanks are ~ 900 gallon
  - Standpipe with mesh cap
  - Heavy aeration
  - Flow through river water
    - 20-22 salinity comparable to collection site
    - Coarse sock filter cleaned once every few days
    - 10 gallons per minute flow rate to each tank
  - Repro shoot to water volume is roughly 1:3
- Typically, we fill 10 tanks at our facility

3) Process them in the "lab"

- Stir the tanks ~ 5x per week
- 2 interns x 1-2 hrs per day
- Mesh paddles to gently remove large material from water column after seeds are released

3) Process them in the "lab"

- After 6- 8 weeks when tanks are cleared of all material other than fines and seeds, we collect the seeds
- Attach a drain pipe to the bottom of the tank
- Attach a 1mm mesh collecting bag

3) Process them in the "lab"

- After 6- 8 weeks when tanks are cleared of all material other than fines and seeds, we collect the seeds
- Attach a drain pipe to the bottom of the tank
- Attach a 1mm mesh collecting bag
- Stir tanks to get seeds collecting in the center
- Crack the stand pipe to let seeds flow into the bag a little at a time

3) Process them in the "lab"

- Pass material through a 4mm sieve to get rid of big shell fragments
- Then run the seeds through the flume

3) Process them in the "lab"

- Pass material through a 4mm sieve to get rid of big shell fragments
- Then run the seeds through the flume



- Fill flume up, attach mesh separator basket, flow at ~ 5cm per second
- Good seeds fall closer to the basket, ok seeds go further, bad seeds go down the drain

3) Process them in the "lab"

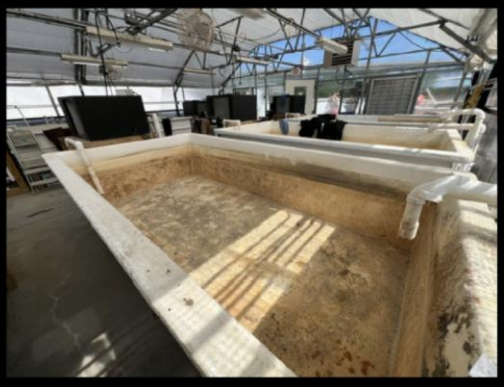
- Split seeds in "A" and "B" batch based on travel distance

- Suck up into sieve stacks to remove remaining debris


STEP 4 – Hold seed until disbursement inside in conditions that mimic source salinities and a constant temperature of 22 Celsius.

4) Hold them until disbursement

- Water Table(s) for holding seeds
  - Matching salinity
  - Vigorous Recirculating
  - 22°C temperature
  - UV sterilization
  - Sand or Bead Filter
- Seeds in plastic tubs
  - One (or more) per batch per source
  - 3cm deep
  - Brick to hold in place



4) Hold them until disbursement

- Quality Assessment

1) Repeated for each batch and source
2) Total volume measured
3) 4 to 7 2ml replicates collected
4) For each rep:
   1) Seed count
   2) # good seeds
      1) Squeeze and drop tests
5) Back end you get # of good seeds available in the fall

4) Hold them until disbursement

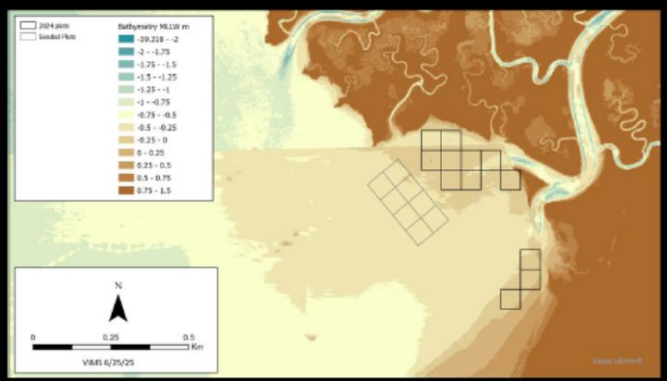
- We often get white biofilm growing on our seeds, its not a problem
- Sometimes polychaetes and other critters that can eat seeds get into tanks, we deal with that as best we can
- If a seed bin is really smelly and has lots of black build up, its probably experiencing a problem

STEP 5 – Select sites for planting.

5) Select your sites for planting

- If you know your planting density (e.g. 100k seeds per acre) and you know how many seeds you have, you can figure out how many acres you can/will plant
- Always plan with some margins for error and some buffers, you will lose seeds during holding (5 to 60% possible, usually about 10%)
- Site selection based on:
  - Available
  - Light and Depth
  - Temperature
  - Currents
  - Sediment type (sand is better)
  - Formerly vegetated
  - Faunal community

  (holes are good, shell is bad)



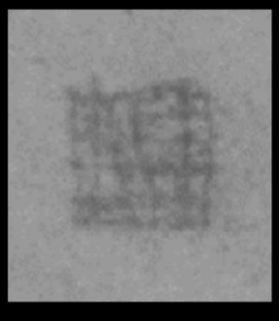
STEP 6 – Plant the seeds (by boat)

6) Plant those seeds!

- Timing aligns with natural field germination (October for us)
- Warm holding tanks will delay germination until you are ready
- First thing you do is repeat your assessment of the seeds
  - Final count for planting estimates
  - Assessment of mortality
- Divide seeds so that you have one bag per plot
  - Volume is based on seed assessment info
  - 90 good seeds per ml requires 1.111 liters for a 100k seed plot

6) Plant those seeds!

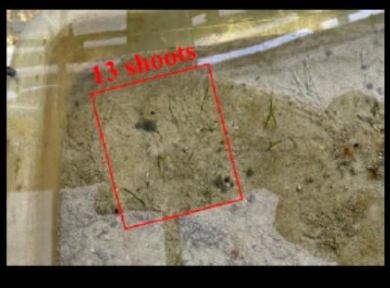
- 4 people per boat
- GPS delineated plot boundaries
- Marker on each plot corner
- 4 passes in each direction to make a waffle
- Seeds sprinkled by 2 people, one on each side of the boat
- 4th person helps prep seeds



STEP 7 – Run winter lab experiments to determine germination success

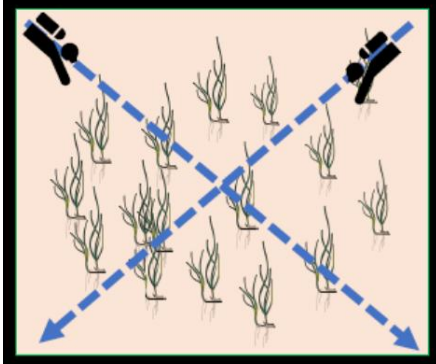
7) Winter Lab Assessment

- 80 seeds per batch in groups of 20 seeds
- Planted to 7mm depth
- Weekly checks to record seedlings
- Stop after 2-3 weeks no shoots (February)



STEP 8 – Conduct spring field assessment

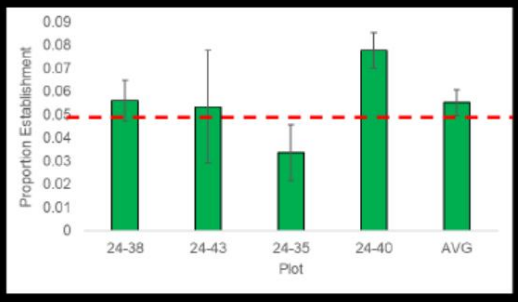
8) Spring Field Assessment

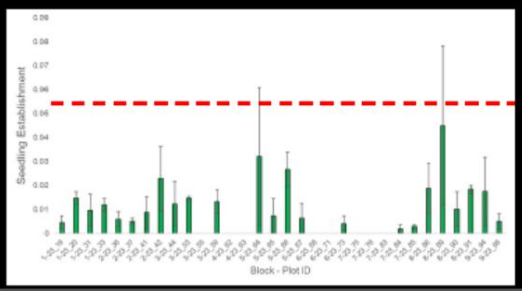


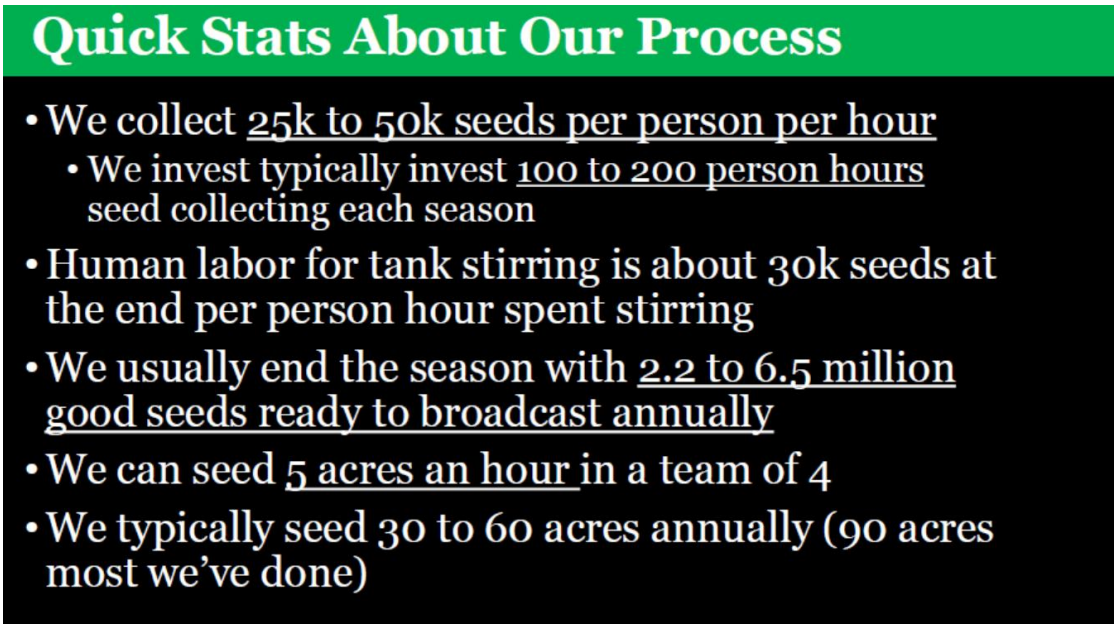
- Assessments occur in the field and lab
- Lab germination study to assess % good seed germination (usually 70-90%)
- Field assessment in April to count seedlings (5% OK, 20% great!)

8) Spring Field Assessment

- Celebrate your success!
- Or drown your sorrows then do a post-mortem about why it didn't work
- Remember the failure is normal
  - VIMS runs 22 to 43% success rate for plot establishment







Q&A with Chris Patrick:

Q: *Are you calculating your donor meadow usage? How do you know how many reproductive shoots to take?*

A: No. We know how many seeds we are harvesting, and we don't worry about donor area usage because we are only removing a small amount from large, healthy meadows. If a meadow is stressed (e.g. got hit by heat wave), we won't sample it.

Q: *Why are your seed processing tanks located outside?*

A: That is where we had space, but it also seems as though having tanks in full sunlight is important. The Nature Conservancy had a site that was outside and once they added a roof their seed yield was reduced and mortality rates increased. Eelgrass shoots and roots are photosynthetic and need light in order for development. We are currently running lab experiments to look into this question.

Q: *Have you tried running recirculating, filtered seawater versus raw water in your holding tanks?*

A: I inherited this system and it works, so I stick with it. I did try making my own water once with Instant Ocean and dechlorinated tap water, but I still found that things grew inside the tanks. Moving seeds from low salinity to high salinity doesn't seem to be a problem, but the opposite can stress the eelgrass seeds. Pumping from the river water at a high flow rate is important.

Speaker: Steve Schott - Habitat Restoration Specialist, Cornell Cooperative Extension

Presentation Title: LISEC Seed Harvest and Storage Guide (CLICK HERE to view slides)

Summary of Presentation:

- The Best Management Practice (BMP) guide was described as a living document that will continue to be editing as more information becomes available. The document does not address changing climate conditions.
- These draft BMPs are a starting point for others to develop their own protocols and what works best for them.
- Be persistent because you will experience more failure than success in restoration activities.
- We hope this guide fills knowledge gaps and improves the success rate of eelgrass seed-based restoration.
- We are working on improving donor meadow assessment and monitoring to establish thresholds for propagation, eelgrass seed processing accessibility for new practitioners, long-term seed storage, pathogen controls, standardization for testing germination viability, and seed priming methods.
- 95% of your investment should be in site selection.

Q&A with Steve Schott:

Q: *When you sterilize seeds to prevent disease, doesn't that destroy the microbiome the plant needs to succeed? Could you sterilize seeds and then re-inoculate them?*

A: Regulation requires sterilization due to any potential disease transfer that could occur with shellfish. You can move eelgrass within an estuary without sterilization but not between estuaries, or else you would need to sterilize or quarantine seeds. An inoculation procedure still needs to be written. Brad Peterson's Stonybrook University lab is looking into microbiome testing.

CCE SITE VISIT

The site visit to Cornell Cooperative Extension (CCE) included an indoor and outdoor component. Participants stayed for an hour in each location, with the indoor activity including 3 breakout groups. A summary of discussion for each component is described below:

Indoor Breakout Summary (20 mins each)

1. Small group discussion with Chris Patrick
2. Flip chart input on three research questions (prioritized by Collaborative during earlier meetings)
3. CCE equipment demonstrations

Breakout 1 Summary: Small group discussion with Chris Patrick

Discussion and Q&A:

Q: *How important is oxygen penetration depth for eelgrass restoration? Is more oxygen in sediments better for eelgrass?*

A: We haven't experienced issues with hypoxia or anoxia. Shallow water and high temperatures are where there is typically a "coastal squeeze". Burying plants at a depth of ¾ -1 ¼m in sediments seems to work best. Widgeon grass prefers shallower depths.

Q: *How do we get more money from the private sector for eelgrass restoration projects? Can we provide a better explanation of the theory and practice for funders to get behind?*

A: Private entities are not interested in spending the money on intangible benefits. Although Submerged Aquatic Vegetation (SAV) is getting a lot more press than in the past, there is still no

certified mitigation bank available. My advice is that if you are given money for 7 years to restore 3 acres of meadows, plant way more than 3 acres, and be sure to do physical adult transfers first to see if they will take before transplanting seed.

Q: *How do you disperse the seeds into the water?*

A: We throw them out by flicking the seeds while sitting on the gunnel of the boat. Feed systems can be used but we prefer the lower tech method since it has proven to work and the seeds spread out as they are falling through the water column.

Q: *Are you augmenting existing beds or restoring them from scratch?*

A: All of the above, including leading edge reestablishment. I recommend being flexible, augmenting and adjusting. Do not keep doing the same thing in the same way if it's not working. Spreading out your efforts is key. Assessment monitoring is important but also allows you to evaluate what needs to change.

Q: *Did you have different success rates at different locations?*

A: I can't tell you exactly which location is better. One way to determine success is to ask yourself if you are making a difference and examine the long term impacts.

Q: *Has there been any development with eelgrass restoration tracking and guidance on the transport of seeds across an estuary? Is there a better way to track what each group is doing?*

A: Yes and no. In Virginia, we maintain a very large tracking database by plot, etc. The Chesapeake Bay has a lot more different groups monitoring SAV species and it is more difficult to track. There is a movement towards improving monitoring and restoration project streamlining.

Q: *How do you identify a potential good site for restoration?*

A: If the top layer of sediments slide, such as a sandbar, that will make your seeds travel. Start with a small site, use environmental data, and try adult plant transplanting in the fall first. Collect rhizomes and transplant plants on the same day. If the adult plant survives the winter, you can try seedings next.

Q: *Have you tried gluing seeds to clams?*

A: We tried it in two different field locations where the sand tends to move a lot because we knew the clams wouldn't move as easily in those shifting conditions. The glued clams did not work but neither did the broadcast seeding we did in the same location. I also tried this procedure in the lab with empty clam shells that we glued seeds to and buried. We had some success but not enough to make it worth our while. Clams also add permitting challenges so it's important to check local shellfish regulations.

Q: *Have you research the microbiome conditions for restoration?*

A: My lab collaborates with microbiome researchers and is currently isolating bacterial strains from corals. We also tried washing seeds in probiotics and directly injecting probiotics into the sediments, but we do not know how this translates into the field. We don't know if the probiotic we introduce will be outcompeted by the natural sediment. There is a microbiome group that formed after Zosterapolooza.

Q: *Do you warm your holding tanks to delay germination?*

A: The temperature in our outside holding tanks varies. It usually starts at 16 degrees Celsius and then warms up. When the seeds are moved into the indoor water tables, the temperature is maintained at steady 22 degrees. Some other groups keep their seeds in the dark at 4 degrees Celsius and bring them up to 22 degrees Celsius. Consistency is important. A change in temperature will trigger germination.

Q: *Do you change the salinities of your systems if they are going into water with higher or lower salinity?*

A: We used to bring our seaside seeds to The Nature Conservancy beds for this reason, but since the TNC staff are experiencing problems in their holding tanks recently, we have been bringing eelgrass shoots back to our facility. You cannot put high salinity seeds into low salinity water immediately. Even taking a high salinity system and backing it down to lower salinity doesn't really work. If you take reproductive shoots from high salinity areas (32) and bring it to lower salinity areas, there isn't as much of an osmotic pressure difference.

Q: *Have you considered changing your incubation time if you are going from high to low salinity?*

A: It's not really worth it.

Q: *Do you ever use standing water?*

A: No, never stagnant water.

Q: *Have you ever had ammonia issues?*

A: No.

Q: *What kinds of animals do you see?*

A: Mostly polychaetes. Lugworms can eat seeds. We have experienced worms eating seeds over the winter in our lab germination experiments.

Q: *How often are you going back to reassess after planting?*

A: Every spring we do our swim overs with divers, but it also depends on what the project requires. Sometimes we switch our later assessments to percent cover or aerial surveys. If you can't see your meadows from the air by the second summer of planting, then it's not considered a meadow.

Q: *Do you think the eelgrass in your outdoor holding tanks are getting enough light since your plants are so densely packed?*

A: Our plants are getting full sun at the surface of our tanks and are stirred/rotated daily. I wonder how that compares in the field when they are submerged at depth? I bet they are getting more light in our tanks than they are in the field.

Q: *How do you reduce sedimentation on your flow-through experiments?*

A: We do have sediment "buildup". One way to avoid this is to make sure there are no intakes on the bottom of your tank and use sock filters. The flow through system is only for holding the reproductive shoots, then we flume and sieve before moving our seeds inside into a temperature controlled environment that is held constant.

Q: *Have you tried any experiments with heat priming your seeds?*

A: Only accidentally. We currently have some grad students and post docs who are trying heat priming as part of a larger project.

Q: *I heard you tried using robots for eelgrass seed collection. Were you successful and do you think it's a methodology that is worth pursuing to characterize and map eelgrass beds?*

A: If your water is clear enough, I recommend aerial surveys to map your beds. If you can't do aerial mapping, then try using side-scan sonar. Our experience with robotics had mixed results. I was disappointed because we didn't actually restore any beds. Robots were used to cut reproductive shoots using a camera that was operated from a boat. The cutting was successful but there was no system for bagging, changing batteries, etc. One company is designing a seed injector but it wouldn't work for our system. Right now robotics are still extremely expensive with no way direct pathway for upscaling.

Maria Rosa mentioned that she uses the Blue Boat/Blue Robotics technology (https://bluerobotics.com/store/boat/blueboat/blueboat/) to map her eelgrass beds in Connecticut. They are still conducting snorkel surveys at the same time to ground truth the technology. You can operate this AUV from your phone and the battery lasts 10 hrs. The main downfall is that it the AUV does not know how to avoid rocks or jetties. The company is in the process of installing a topographic map.

Q: *How did you arrive at 22 degrees Celsius for seed holding. Do you think this temp could change with the warming climate?*

A: There were a bunch of tests in the 90s that came up with this temperature. I think it's not the holding conditions themselves but the constancy (cold, dark, anoxic, or not) that makes the difference.

Q: *Can you save seeds for a whole year?*

A: I have never tried it, although I did hear of someone who held seeds for 17 months. Seed mortality increases over time. You can trick them and hold them longer but you will have more mortality.

Q: *Do you stain seeds?*

A: Yes, with tetrazolium. Staining is so much more time consuming than it is worth. There is also some level of subjectivity with the color.

Q: *What are your best study site metrics?*

A: It depends on how much money and time you have. Grain size, compaction, presence of *Diapatra* worms, sheer stress, wave energy within a sand bar system, light, temperature, and depth are all good metrics. Sometimes you can't tell what metrics are best to provide results.

Q: *Have you done restoration projects that combine Zostera and Rupia?*

A: Yes. The best way to do it is use the *Rupia* inshore and *Zostera* offshore. Multi-species restoration allows you to hedge your bets.

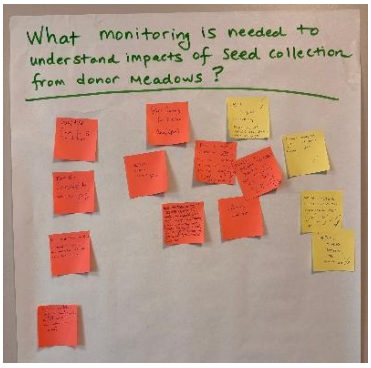
Q: *Do you use one or multiple sources to restore your plots? Do we have to worry about genetics and would it make sense to plant more robust plants in areas with poor water quality?*

A: I only use one source for now but hoping to get into using multiple sources in the future. We have one spot that we refer to as a "super seeds" meadow that has high water flow, clear water, and where the water gets very warm each summer. Those seeds do the best throughout processing and they do the best when we replant them.

Q: *Is it ok to hold seeds at colder temperatures?*

A: Seed storage temperature needs to be held constant. I wonder about cues. Seeds seem to maintain source timing distinction.

Breakout 2 Summary: Flip chart input on three priority research questions (prioritized from previous Collaborative meetings)



Question: What monitoring is needed to understand impacts of seed collection from donor meadows?

Workshop Participant Input	**Agree**
Create a resource that practitioners can refer to in order to see if a bed has been sampled from recently and its location. For example, consider a master spreadsheet similar to the flowering one that EPA created a few years ago.	√ √ √ √ √ √ √ √ √ √
Annual health assessments of donor beds. Related comments: • Long-term baseline data is important so normal variability is not mistaken for impacts from harvesting. • After understanding the size and reproductive capacity of a meadow, the impact of collection could be made minimal. For example, if harvesting a small % of a large healthy meadow, the impact is likely null. • Use GPS to harvest from different parts of a meadow each year.	√ √ √ √ √ √ √ √ √ √
Preference for assessments to be done as in-water sampling vs. by aerials Related comments: • Use ROV/AUV surveys to determine % cover and density	√ √
Sediment microbial analysis	√ √
Light and temperature monitoring (site specific requirements or thresholds)	√ √
Annual or biannual mapping of donor beds	√
Establishment rates of seeds/seedlings in donor meadows over multiple years and decades	
Life table analysis	
Aerial surveys for extent (drone, airplane)	

Question: What monitoring is needed to determine restoration "success"?

Workshop Participant Input	**Agree**
Annual and longer term monitoring of restoration sites with consistent bed size, density/number of plants, and presence of reproductive shoots measured. Related comments: • Monitor several times per year for the first 3-5 years after planting/seeding • Depends on goal(s) of the project (e.g. specific seedling density, adult density over 1+ years, faunal species diversity/richness, etc.)	√ √ √ √ √ √ √

Decide on a standardized set of criteria or a definition for restoration benchmarks/"success" to enhance comparisons. Examples to define success = populations growth, secondary habitat development, self-seeding, annual bed expansion and survival	√ √ √ √ √ √
Research effects of marine pollution on eelgrass outcomes (e.g. microplastics, toxicology of heavy metals, nitrogen and phosphorus)	√ √
Long term and consistent monitoring of main drivers/impacts at restoration sites	√ √
Functional assessment within the broader ecosystem, in addition to biophysical assessment	
Mid to long term changes in sediment characterization	

Question: What is needed to decrease the % loss of seed and keep seed viable until planting?

Workshop Participant Input	**Agree**
Aeration and sterilization BMPs	√ √ √ √ √ √ √
Creation of an open sourced community where ideas can be easily shared/adapted, and we can learn from each other about methods and parameters (e.g. temperature, light, water flow, pathogens, microbiome) so resources can be prioritized. Examples from the aquaculture industry would be helpful to explore.	√ √ √ √ √ √
Greater collection mechanisms & methods and more investment in seed processing practices that are tailored to LIS	√ √ √ √
Research methods for holding seeds reduce germination in tanks and maximize viability	√ √ √
Pathogen/microbial research	√ √
Better understand how to control & prevent premature germination	
Improved knowledge transfer between efforts across the study (comparative data)	
Money for research so we're not so reliant on professional judgement	

Breakout 3 Summary: CCE equipment demonstrations

In the third breakout session, CCE staff provided examples of various equipment they use for restoration:

Kim Manzo talked about the various methods of eelgrass restoration CCE has utilized over the years, including both seed based restoration and adult shoot transplanting methods. For seed based restoration, she demonstrated how CCE's Buoy Deployed Seeding (BuDS) Method is used, by holding reproductive/flowering eelgrass shoots just harvested into dispersal systems, each consisting of a pearl

net and buoy, and anchored by a half cinderblock, as a low-cost way to seed a restoration site. She also went over methods of adult shoot transplant including CCE's rock and the "tortilla" methods.

Jason Havelin then went over ways of constructing sieves out of waterproof lumber at various mesh sizes for the purpose of processing eelgrass seeds from plant material. Five to ten millimeter mesh size is used for washing the seeds through and collecting plant material, then 1mm mesh is used for holding the seeds and washing the remaining detritus through. Much of the material was sourced from low-cost aquaculture gear that was repurposed from the shellfish hatchery.

Outdoor CCE Facility Tour Summary:

Photo showing location of old and future greenhouse platform

- Workshop participants view the Suffolk County Marine Environmental Learning Center (SCMELC). These facilities are shared by the habitat restoration team that Steve Schott from CCE is a part of. The space is also used by shellfish hatchery practitioners in addition to eelgrass restoration practitioners.
- Their greenhouse is being replaced. In that above photo, participants are standing on the old greenhouse platform, which is the same location as the new one to be built. The old one lasted for decades, but it wasn't used for eelgrass transplants or seed processing because it was too hot (air temperatures would get >100F at times). The new greenhouse will have the ability to open roof panes, so temperatures are expected to be cooler and easier to regulate.
- Most of CCE's effort in the last ~25 years has been focused on re-planting adult eelgrass plants. The seed-based work has ramped up in the last decade.
- Steve and the CCE team originally learned methods from Jerry Churchill from Adelphi University, including the standing water method of eelgrass seed processing. This has low resource requirements, but the water gets a very foul odor. They pull Peconic Bay water (they used to source well water, but it was rich in iron and stained everything orange).

- Significant temperature changes during seed storage are problematic. Last year there was a cold snap in October (~30F) for about three days before returning quickly to 70F, and it led to mortality of ~1/3 of their seeds.
- For seed slurry injection into sediment, CCE had tried pastry bags in the past, but they were really challenging to work with in the water.
- Last year they collected ~1M seeds across ~20 dive hours between two CCE staff (Steve and Jason.)
- They have co-opted much of their setup from the bivalve aquaculture neighbors.
- For the reproductive shoot storage, they are now using Intermediate Bulk Containers (IBC's). These are lightweight and can be picked up empty by two people. They are also modular and can be stored stacked and off site during the off season.
    - IBC has a bottom side drain that sort of funnels downward, in theory will be easier to collect seeds.
    - CCE is getting the IBC's for free from a wastewater treatment plant (the WWTP gets their flocculent shipped in them and then when they are done using them, they're usually looking to get rid of them for free). Just rinse them well with seawater prior to use.

photo of IBC container

- Water flow is to the bottom of the tank and the outlet is near the top to encourage water flow from bottom to aerate shoots and prevent anoxic conditions. Put a mesh screen over the top of the outlet and clean it of debris every few days.
- Their fiberglass raceways cost ~$2k each and require a 6-month order lead time. They're challenging to move and take up a larger relative footprint compared to the IBC's.
- They hold their reproductive shoots in flowing water and check on / stirs them daily (except weekends). They're usually held for about four weeks, or until ~75% of seeds look like they've dropped from the shoots. At that point, CCE staff start removing vegetative wrack and checking for seeds.
    - An option if you don't have the infrastructure (flowing seawater, space for tanks): hold collected shoots in aquaculture spat bags and hang them off of a dock while seeds release. (Fine mesh bag on the outside will retain seeds, wider mesh back on the inside will keep shoots separate as seeds fall.)
- After shoot tanks are drained, they move seeds to raceways in upwelling silos. They get flow-through seawater, which is not a closed system like VIMS's.
- Sea squirts are a bio-fouling problem.
- They sometimes get a 1:1 ratio of seeds to Lacuna snail shells. They're a similar size as the seeds and challenging to separate out.
- The most tedious step in the process is cleaning / sieving the seeds.
- *Allison Fogg (Maine) commented*: they collect spathes off of shoots immediately after collection to minimize vegetative material in their storage tanks. It makes that step more time-consuming but it does prevent as many Lacuna snails.

- In the photo on the right, Steve is piloting doing a "sluice" density separation inspired by gold prospectors separating ores. He demonstrates some varying density plastic balls and farro (simulating eelgrass seeds) in his sluice made of plastic lumber and stainless steel fittings.

    - The sluice has ½ inch high “ripple bars”. He’s experimenting with the slope of the sluice and the distance of the ripple bars and also needs to test water flow rate impacts.
- *Question:* Do you worry about rain events in your open outdoor tanks?
    - *Answer:* Not really, since we’re using flow-through water and it’s replenished, but we do cover the upwelling silos containing seeds with plastic if we expect it to rain a lot.
- *Question:* what shellfish pathogens are the regulators worried about being transferred on eelgrass seeds?
    - *Answer*: Steve is a botanist, but his understanding is that anything that requires an active host. A Stonybrook University shellfish pathologist told Steve that a 5-min soak in a dilute bleach solution should be more than enough to kill the pathogens.
    - When considering transporting seeds from the south for genetic resilience to heat (which we’re still not 100% sure is going to work), Steve thinks the chance for a shellfish pathogen to travel with the seeds is minimal, but not 0%. And the risk to shellfish industry if it *does* happen warrants regulation / investigation.

Appendix A – Workshop Agenda

Date: Tuesday – May 19, 2026

Location: AM – Peconic Dunes Camp, 6375 Soundview Ave, Southold, NY 11971
PM – Cornell Cooperative Extension, 3690 Cedar Beach Road, Southold, NY 11971

9:00 – 10:20	**Cross Sound Ferry** from New London to Orient Point (or in-state travel time for New Yorkers)
10:30 – 11:00	**Bus transport** from Orient Point ferry terminal to Peconic Dunes Camp
11:00 – 12:30	**11:00 – 12:00, Presentation & Discussion** Chris Patrick, Associate Professor, Virginia Institute of Marine Science Focus: infrastructure/setup and protocols used by the VIMS research team for seed based restoration efforts – challenges & lessons learned **12:00 – 12:30, Overview & Group Discussion on Best Management Practices Draft** Steve Schott, Marine Botany/Habitat Restoration Specialist, Cornell Cooperative Extension
12:30 – 1:30	**Lunch (provided)** + networking and short walk to beach if interested
1:30 – 2:00	**Bus Transport** to Cornell Cooperative Extension (CCE) of Suffolk County
2:00 – 4:00	**CCE Site Visit (two groups rotate – 60 mins in each location)** 1. View CCE eelgrass restoration facility upgrades (outdoor) 2. Breakouts (indoor – 20 mins each) a. Small group discussion with Chris Patrick b. Input on priority research topics c. CCE equipment demos
4:00	**Adjourn** (and prepare for bus transport back to Orient Point Ferry)
4:15 – 4:45	**Bus Transport** and board Orient Point Ferry

Appendix B – Workshop Registrants

First Name	Last Name	Organization
Catie	Alves	Save The Bay
Patrick	Barrett	RIDEM Division of Marine Fisheries
Lauren	Barrett	CT National Estuarine Research Reserve
Della	Campbell	NYSDEC
Chris	Clapp	NYSDOS - South Shore Estuary Reserve
Hannah	Collins	Peconic Estuary Partnership
Anthony	Daniels	Great Island Foundation
Devin	Domeyer	Maine Coastal Program
Alex	DuMont	NEIWPCC
Allison	Fogg	COBALT/Team Zostera
Ashley	Hamilton	CT National Estuarine Research Reserve
Jason	Havelin	Cornell Cooperative Extension
Stephen	Heck	The Nature Conservancy
Randall	Hughes	Northeastern University
Gavin	Jackson	CT DEEP
Shauna	Kamath	NYSDEC
Jason	Krumholz	CT National Estuarine Research Reserve
DeAva	Lambert	CT DEEP
Shelby	Larubina	CT National Estuarine Research Reserve
Matthew	Leason	University of Connecticut
Hazel	Levine	CT National Estuarine Research Reserve
Bill	Lucey	Save the Sound
Katie	Lund	CT National Estuarine Research Reserve
Kimberly	Manzo	Cornell Cooperative Extension

Trevor	Mattera	Piscataqua Region Estuaries Partnership
Falyn	McQuarrie	CT National Estuarine Research Reserve
Juliana	Merluccio	NEIWPCC/NYSDEC
Andrew	Mirchel	Save the Great South Bay
Suzanne	Paton	US Fish and Wildlife Service
Chris	Patrick	Virginia Institute of Marine Science
Carl	Persson	Ocean Solutions Inc
Brad	Peterson	Stony Brook University
Maria	Rosa	Connecticut College
Allison	Rugila	Save the Sound
Veronica	Runge	NMFS
Forest	Schenck	MA Division of Marine Fisheries
Steve	Schott	Cornell Cooperative Extension
Sarah	Stagner	Stony Brook University- SoMAS
Isabelle	Stinnette	NY-NJ Harbor & Estuary Program
Cayla	Sullivan	EPA Long Island Sound Office
Hannah	Vagts	Fishers Island Seagrass Management Coalition
Robert	Vasiluth	Save Environmental
Jamie	Vaudrey	CT National Estuarine Research Reserve
Marissa	Velasquez	Peconic Estuary Partnership
Kayla	Walsh	NY Sea Grant
Emily	Watling	CT Audubon Society
Harry	Yamalis	CT DEEP