

An underwater photograph showing a dense field of eelgrass. The grass blades are long and narrow, with some appearing green and others brownish, indicating different stages of growth or decay. The water is a murky, light blue-green color. The text "Overview of Long Island Sound Eelgrass Flowering Study 2024" is overlaid in white, sans-serif font in the center of the image.

Overview of Long Island Sound Eelgrass Flowering Study 2024

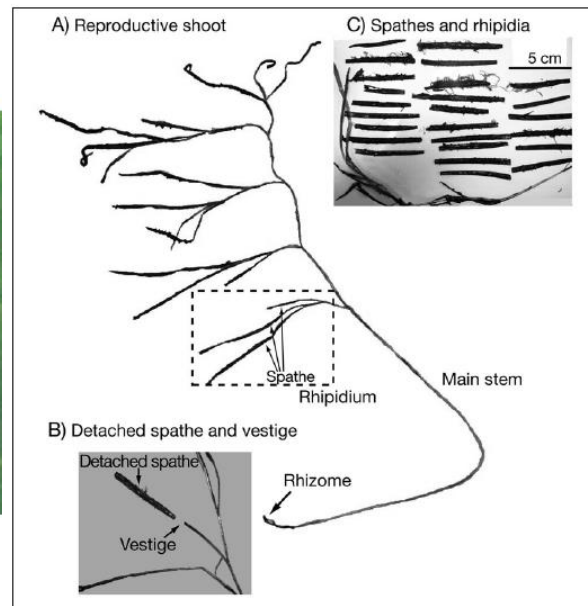
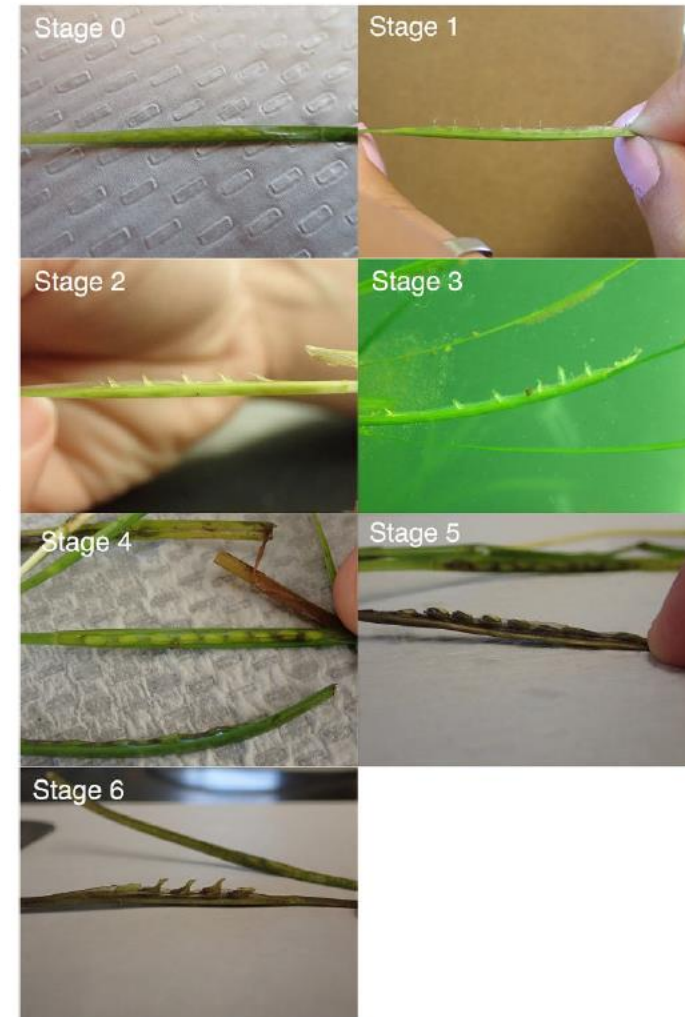
Eelgrass Flowering Study Protocol



Assessment A: Phase of seed maturation (seed scoring), *at least every-other week, and/or*

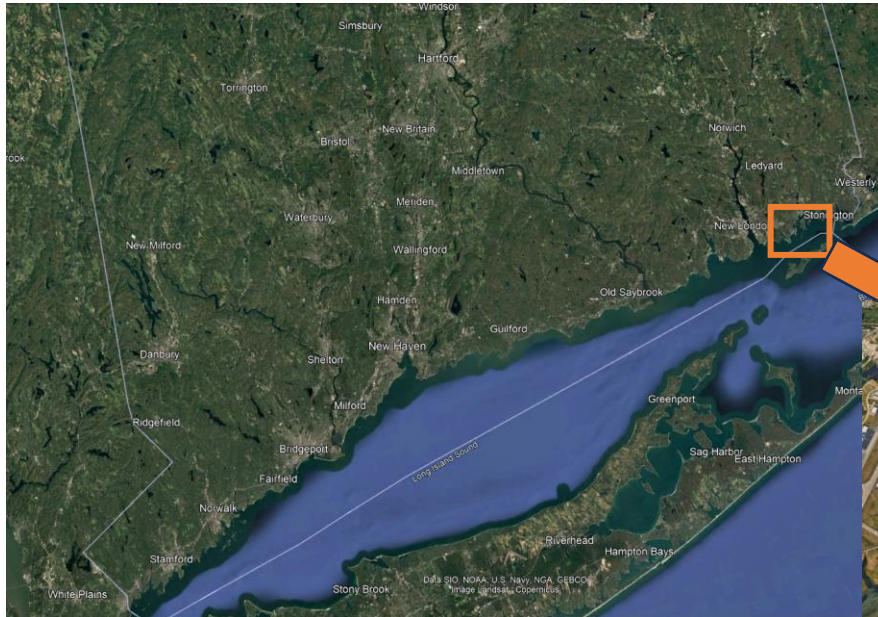
Assessment B: Flowering shoot density, *every-other week, or at least once per year when at least 50% of spathes reach stage 4, and/or*

Assessment C: Seed density, *at least once per year when at least 50% of spathes reach stage 4.*





Connecticut Department of Energy and Environmental Protection 2024 Eelgrass Flowering Survey Kelly Streich



APPROACH:

Sampled every week from June 4 – July 23

Set up transect at measured distance from piling

Collected 5 samples every 3 meters

- 3m, 6m, 9m, 12, 15m along transect

Identified seed maturity stage

Additional

- YSI – WT, Cond, DO, pH, Turbidity
- Nutrients for Lab Analyses

Counted flowering eelgrass plants

- 7/2 - 1m² at 15m along transect
- 7/8 - 2m² at 6 m & 12m along transect
- 7/23 - 2m² at 12m & 15m along transect



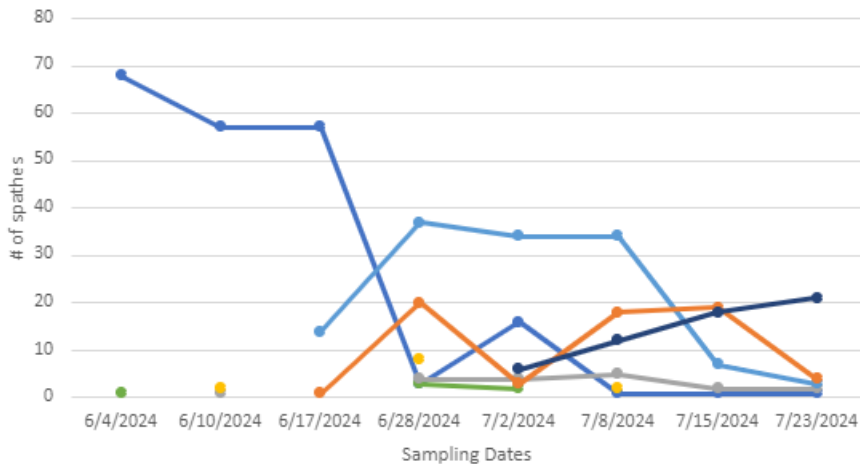
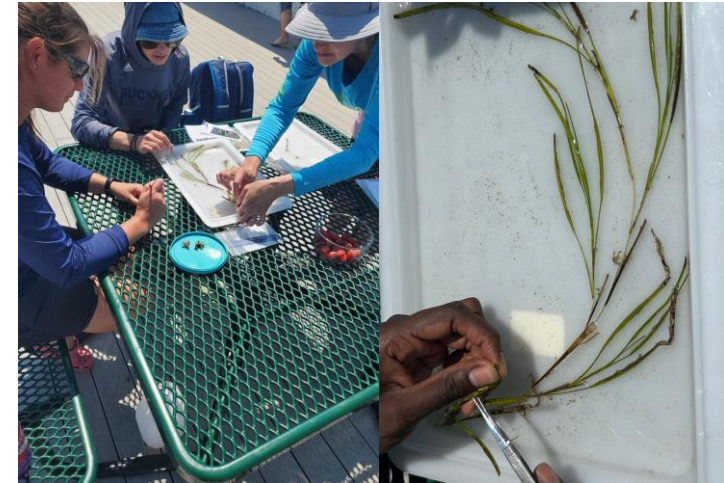
FINDINGS:

Difficult to ID stages

Stages 1,2,3 seem to have occurred very quickly – These stages were not abundant

The highest abundance of Stage 5 noted between 7/8 and 7/15

Die off is very rapid - Noted rhipidiums missing and spathes broken off on 7/23



Count of spatheStage	Stage # (0-6)							UNK	Grand Total
Sample Dates	0	1	2	3	4	5	6	UNK	Grand Total
6/4/2024	68	1						7	76
6/10/2024	57		1	2					60
6/17/2024	57				14	1			72
6/28/2024	3	3	4	8	37	20			75
7/2/2024	16	2	4		34	3	6	3	68
7/8/2024	1	5	2		34	18	12	2	74
7/15/2024	1	2			7	19	18	3	50
7/23/2024	1	2			3	4	21	9	40
Grand Total	204	6	18	12	129	65	57	24	515



FINDINGS:

Reproductive shoot abundance

$7/2 = 40$ reproductive shoots
per square meter (0.0625 quadrat)**

$7/8 = 15$ reproductive shoots per
square meter (0.25 quadrat)

$7/23 = 22.5$ reproductive shoots per
square meter (0.25 quadrat)



LESSONS LEARNED:

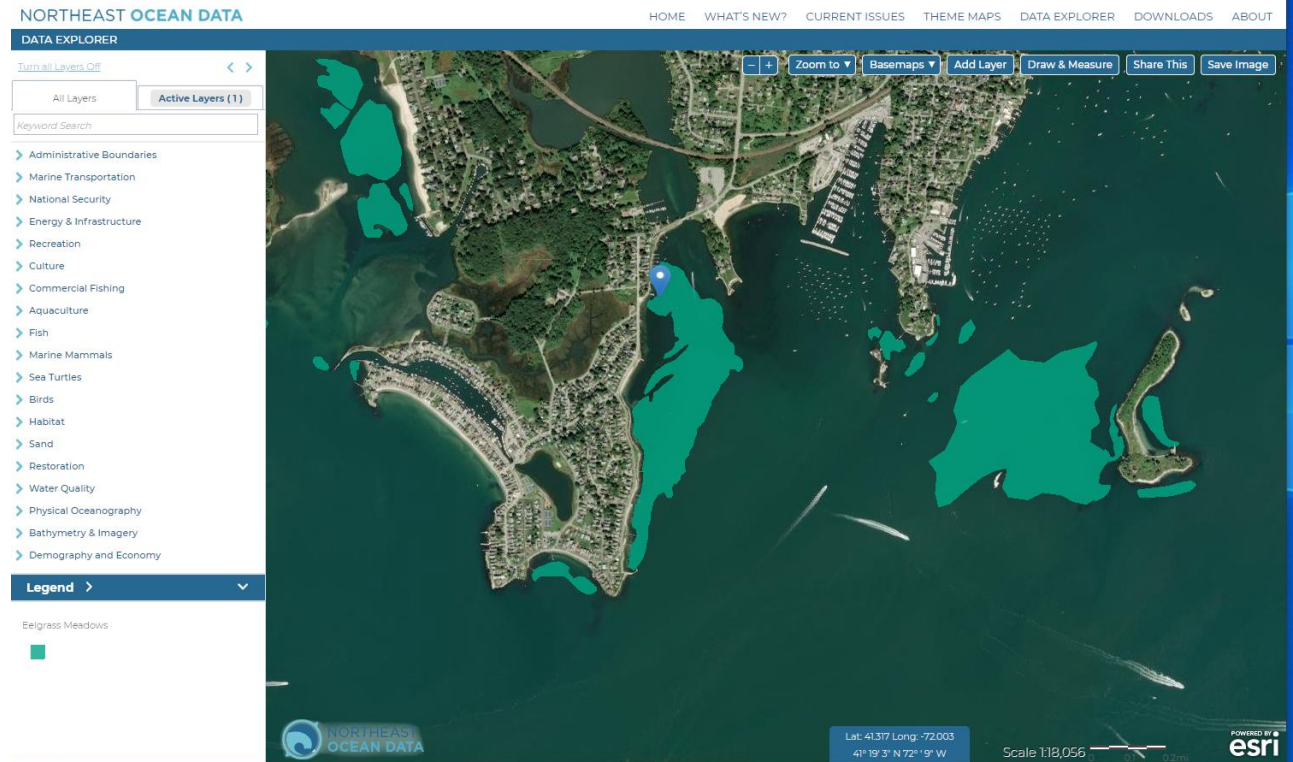
- Keep plants wet!
- Made laminated color cards of spathe stage to help with ID
- Marked flowering plants to not double count
- 0.25 square meter quadrat worked better than 0.0625
- Used boogie board to hold field gear
- Sample at low tide!
- Use a scheduler to have rolling back up field dates

Week	Date	Arrive on site	Out of water	Low tide	Low (ft)	TOTAL	Yes	If need be	Kelly Streich	Abbie Winter	DeAva Lamber	Ga
2	Friday, June 14, 2024	7:07:00 AM	10:07:00 AM	10:07 AM	0.69	1	1	0		Y		
3	Monday, June 17, 2024	10:47:00 AM	12:17:00 PM	12:17 PM	0.82	3	3	0	Y	Y	N	
	Tuesday, June 18, 2024	11:31:00 AM	1:01:00 PM	1:01 PM	0.82	1	1	0	N	N	N	
	Thursday, June 20, 2024	1:04:00 PM	2:34:00 PM	2:34 PM	0.69	4	3	1	N		If need be	Y
	Friday, June 21, 2024	1:50:00 PM	3:20:00 PM	3:20 PM	0.62	6	1	5		If need be	If need be	Y
4	Monday, June 24, 2024	7:00:00 AM	8:30:00 AM	5:45 AM	0.03	4	4	0	N	Y	Y	Y
	Monday, June 24, 2024	3:16:00 PM	4:46:00 PM	5:46 PM	0.46	4	3	1	N		If need be	Y
	Tuesday, June 25, 2024	8:05:00 AM	9:35:00 AM	6:35 AM	0.07	2	2	0	N	Y	N	N
	Tuesday, June 25, 2024	4:14:00 PM	5:44:00 PM	6:44 PM	0.46	4	2	2	Y		If need be	Y
	Wednesday, June 26, 2024	8:56:00 AM	10:26:00 AM	7:26 AM	0.07	3	3	0	Y	N	N	Y
	Wednesday, June 26, 2024	4:30:00 PM	6:00:00 PM	7:46 PM	0.49	1	1	0	N	N	N	N
	Thursday, June 27, 2024	7:30:00 AM	9:00:00 AM	8:16 AM	0.10	2	2	0	Y	N	N	N
5	Friday, June 28, 2024	7:30:00 AM	9:00:00 AM	9:08 AM	0.16	6	6	0	Y	Y	Y	Y
	Monday, July 1, 2024	10:21:00 AM	11:51:00 AM	11:51 AM	0.39	5	5	0	Y	Y	Y	Y
	Tuesday, July 2, 2024	11:17:00 AM	12:47:00 PM	12:47 PM	0.43	5	5	0	Y	Y	Y	Y
	Wednesday, July 3, 2024	12:13:00 PM	1:43:00 PM	1:43 PM	0.46	4	3	1	N		If need be	Y
	Friday, July 5, 2024	1:59:00 PM	3:29:00 PM	3:29 PM	0.46	4	3	1	Y	N	Y	
6	Monday, July 8, 2024	7:11:00 AM	8:41:00 AM	5:41 AM	0.20	6	6	0	Y	Y	Y	
	Monday, July 8, 2024	3:17:00 PM	4:47:00 PM	5:47 PM	0.62	3	0	3	N		If need be	N
	Tuesday, July 9, 2024	7:55:00 AM	9:25:00 AM	6:25 AM	0.30	3	3	0	Y	N	N	
	Tuesday, July 9, 2024	4:06:00 PM	5:36:00 PM	6:36 PM	0.72	5	2	3	Y		If need be	Y
	Wednesday, July 10, 2024	8:38:00 AM	10:08:00 AM	7:08 AM	0.39	3	1	2	N		If need be	Y
	Thursday, July 11, 2024	9:21:00 AM	10:51:00 AM	7:51 AM	0.52	2	2	0	N	Y	Y	
7	Friday, July 12, 2024	8:02:00 AM	9:32:00 AM	8:32 AM	0.62	5	5	0	Y	Y	Y	
	Monday, July 15, 2024	8:30:00 AM	10:00:00 AM	10:43 AM	0.89	3	3	0	N	Y	N	
	Tuesday, July 16, 2024	10:02:00 AM	11:32:00 AM	11:32 AM	0.92	3	3	0	N	Y	N	
	Thursday, July 18, 2024	11:45:00 AM	1:15:00 PM	1:15 PM	0.75	1	0	1	N		If need be	N



CONSIDERATIONS:

- Install markers for start and end of transect during the season
- Scale up data collection to learn seed donor capacity of the meadow





The CREW:



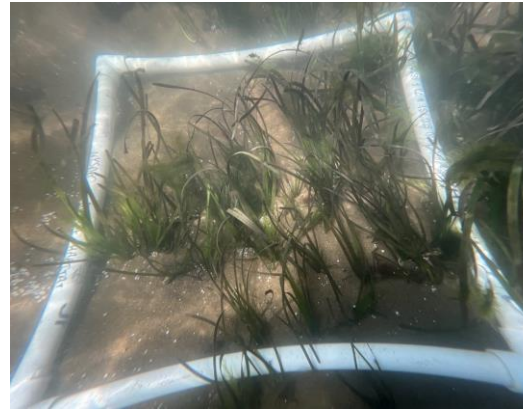
Carriel Cataldi
Emma Coffey
Ali Hibbard
Gavin Jackson
DeAva Lambert
Abbie Winter
Kelly Streich



Sampling Period:

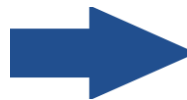
6/13/2024 to 7/9/2024

Surveyed weekly for 5 weeks



Results:

Date	Site	Sample Shoot #	Rhipidium #	Spathe #	Spathe Stag
6/13/2024	Heckscher	1	1	1	4
6/13/2024	Heckscher	1	1	2	3
6/13/2024	Heckscher	1	2	1	4
6/13/2024	Heckscher	1	2	2	2
6/13/2024	Heckscher	1	2	3	2
6/13/2024	Heckscher	1	3	1	5



Date	% above stage 4	% at stage 6
6/13	35%	5%
6/18	★ 56%	3%
6/28	67%	52%
7/3	73%	66%
7/9	86%	84%

Lessons learned/recommendations?

- Start the study early
- After peak flowering was reached, the number of samples at stage 6 went up dramatically --> The window for prime seed collection is very narrow and after the peak there is significantly less seed stock available.



Sampling Events: 10 May – 2 Aug, 10 times

Seed Counts: 26 Jun – 28 Jul, 5 times

Most seeds per spathe in early July

May and August had the smallest flowering shoots

Flowering shoot density was highly variable

Lessons learned/recommendations:

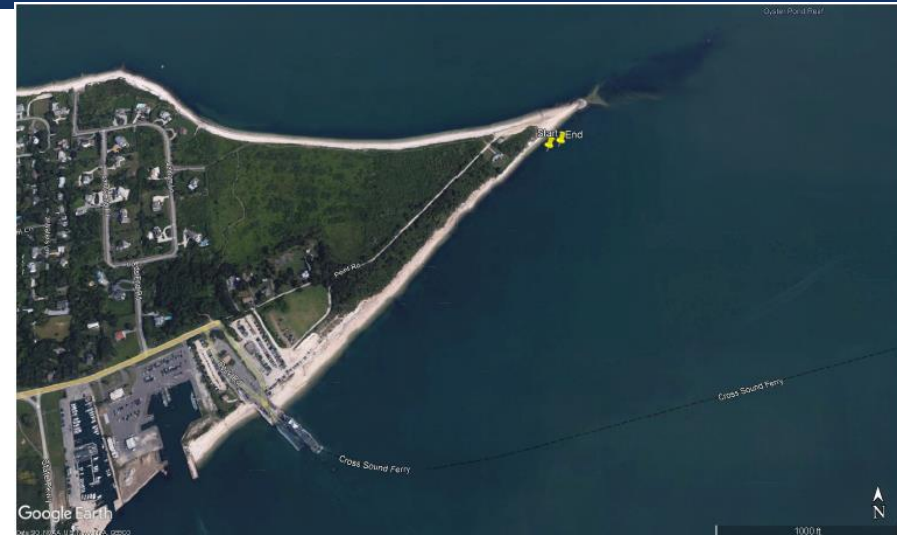
Random sampling was easy, but not the best collection method

When did you sampling? How many times?

- 7/10, 7/15, and 7/22

Observations

- Due to the open coast nature of the site, it is subject to storm driven waves which can cause significant erosion in the meadow
- **Seed maturity**
- 7/10: Mostly Stage 4
- 7/15: Mostly Stage 5
- 7/22: Mostly Stage 6



7/10/2024		7/15/2024		7/22/2024	
Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots
1	3	1	4	1	3
2	6	2	3	2	2
3	4	3	3	3	1
4	7	4	6	4	5
5	15	5	8	5	6
6	12	6	8	6	7
7	12	7	6	7	4
8	3	8	5	8	6
9	4	9	10	9	7
10	0	10	3	10	3
11	0	11	2	11	3
12	4	12	0	12	3

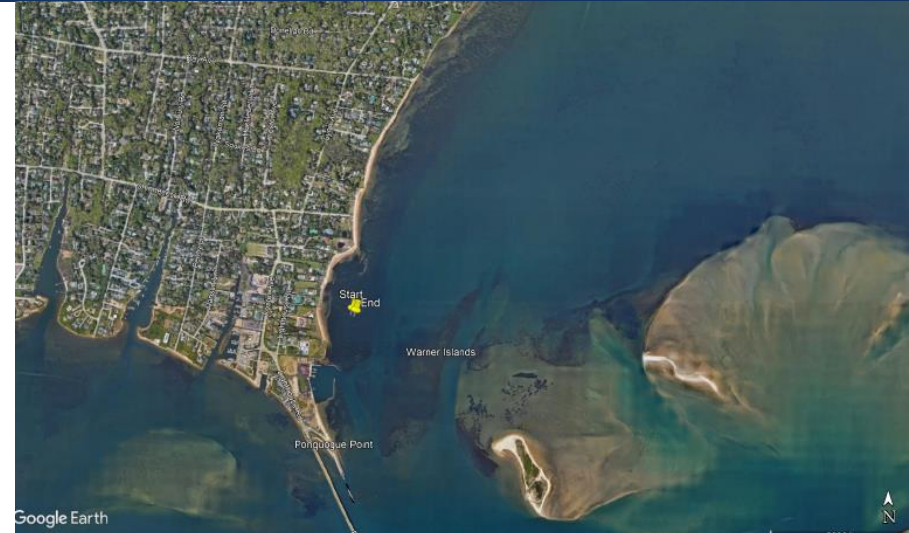


**When did you sampling?
How many times?**

- 6/18, 7/1, and 7/9

Observations:

- Site is influenced by ocean water on incoming tides, moderating water temperature
- **Seed Maturity**
- 6/18: Mostly 4
- 7/1: Mix of 4 and 5
- 7/9: Mix of 5 and 6



6/18/2024		7/1/2024		7/9/2024	
Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots
1	2	1	2	1	2
2	1	2	0	2	2
3	3	3	1	3	0
4	3	4	1	4	0
5	4	5	2	5	4
6	2	6	2	6	4
7	3	7	3	7	0
8	3	8	0	8	1
9	7	9	0	9	2
10	1	10	1	10	2
11	0	11	1	11	3
12	2	12	1	12	6



When did you sampling? How many times?

- **5/20, 5/30, 6/13**

Observations:

- **Seed Maturity**
- 5/20: Older spathes were mostly 4; new spathes were mostly 0 and 1
- 5/30: Mostly 4
- 6/13: Mostly 5



5/20/2024		5/30/2024		6/13/2024	
Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots	Quadrat Number	Reproductive Shoots
1	2	1	1	1	0
2	1	2	1	2	0
3	0	3	0	3	1
4	1	4	1	4	0
5	1	5	0	5	2
6	0	6	0	6	0
7	0	7	0	7	1
8	3	8	1	8	0
9	0	9	0	9	1
10	1	10	2	10	2
11	1	11	0	11	0
12	0	12	0	12	0
13	1	13	1	13	0
14	2	14	0	14	0
15	1	15	1	15	0
16	1	16	1	16	0
17	2	17	2	17	0
18	1	18	0	18	0
19	0	19	0	19	1
20	0	20	1	20	0

- **Objective:** Identify eelgrass meadows with the highest proportion of flowering shoots to serve as donor beds for future seed-based restoration projects.

• Why shift to seed-based restoration?

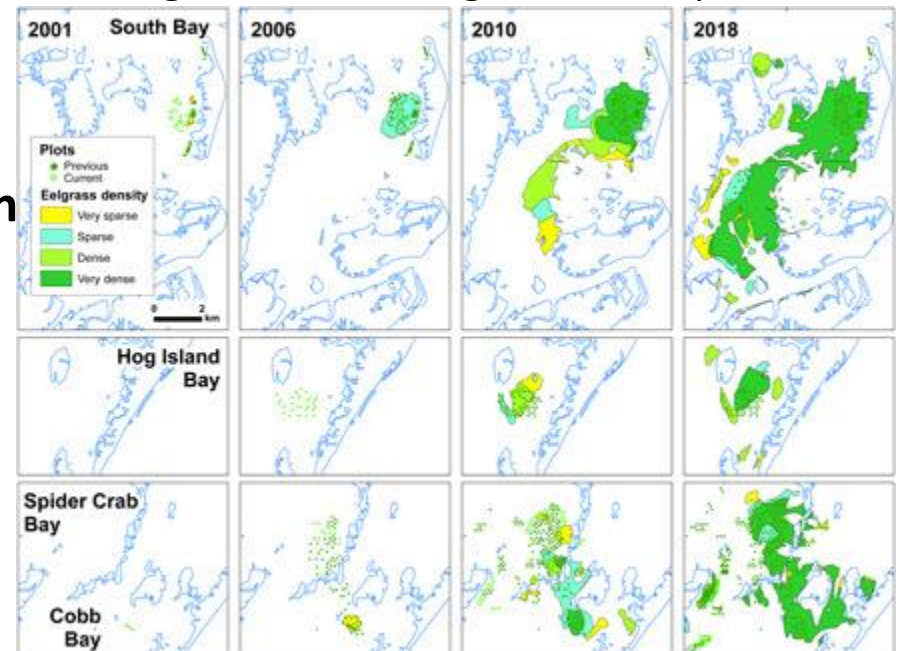
• Advantages

- Reduce/eliminate need for scuba
- Rapid recovery
- With minimal training, anyone can
- Easier to scale up

• Disadvantages

- Potentially high predation rates
- Seeds can be washed away
- Infrastructure needs

Virginia Coastal Lagoons Example





- **Request for Proposals: Initiate and Develop a Long-Term Targeted and Large-Scale Eelgrass Seed Dispersal Restoration Initiative**
- **Organization: NEIWPCCEPA**
- **Project Period: October 1, 2024-September 30, 2028 (RFP to be released in October 2024)**
- **Project Cost: \$1,500,000 (for 3 years)**
- **Objectives: The objective of this proposal is to develop and release a Request for Proposals (RFP) to initiate a long-term targeted and large-scale eelgrass seed dispersal restoration initiative. The amount requested would support the program's set up as well as 3 years of seed dispersal restoration. The project leads will continue to develop and refine the RFP, but some key components to be highlighted in the RFP are:**
 - Expanding acreage in well-established eelgrass meadows
 - Piloting establishment of eelgrass meadows in areas where there is currently no eelgrass but suitability is high
 - Increasing the gene flow/genetic diversity in eelgrass meadows
 - Piloting innovative approaches to broadcast eelgrass seeds
 - Coupling other restoration techniques with seed broadcasting (i.e., building off Long Island Sound Research Grant Program)
 - Post-dispersal monitoring