



Keaton Beach Urchin Survey updates

Keaton Beach
Updates from April & May 2023
Big Bend Seagrasses Aquatic Preserves
Contact: Kate Suchanec
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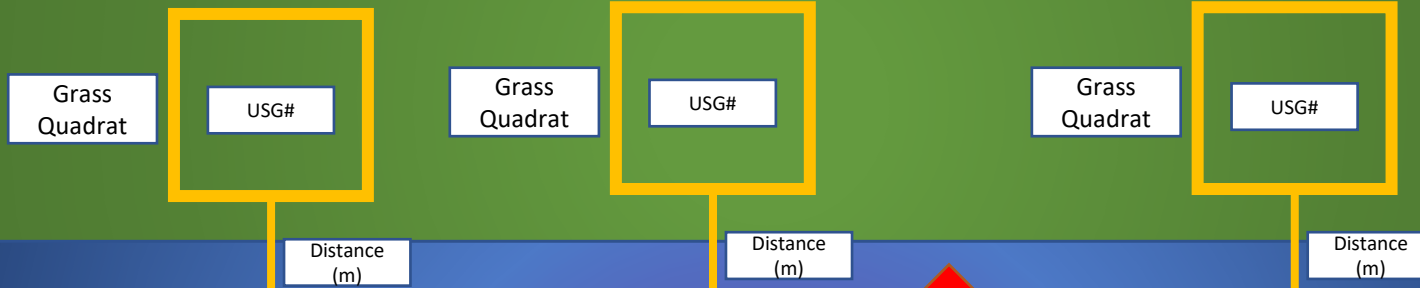


GPS coordinates taken while following the urchin line on 8 February 2023. The line extends from each end, staff had limited time to follow the full length. Aerial mapping is proposed to obtain better imagery. Urchin line is orange, green markers are continuous seagrass monitoring stations used yearly by BBSAP. Marked path is approximately 4 kilometers.

Original Survey Design

“tri-mix” method

Grass Area



Urchin Line

Grazed Area

April Survey Sites Length

Survey site 7 total transect length: 13m
USU07 placed at 6m mark

Only one tri-mix completed in April due to high winds limiting number of field days.

May Survey Sites Length

Survey site 8 total transect length: 26m.
USU08 placed at 13m mark

Survey site 9 total transect length: 16m.
USU09 placed at 8m mark

Survey site 10 total transect length: 21m.
USU10 placed at 11m mark

Site 10 was placed based on the coordinates of the original February site 01 sampling event.



Urchin survey sites labeled. USG08 is now the furthest survey inland.

May and April survey sites added in, you can see the line in this area has not moved as far inland. Furthest inland is site 08 which was 0.29 miles from the closest February monitoring site (USU02). USU07 was the only site sampled in April and USU08 was only 0.05 miles from it after one month.



Urchin survey sites labeled. USG08 is now the furthest survey inland.

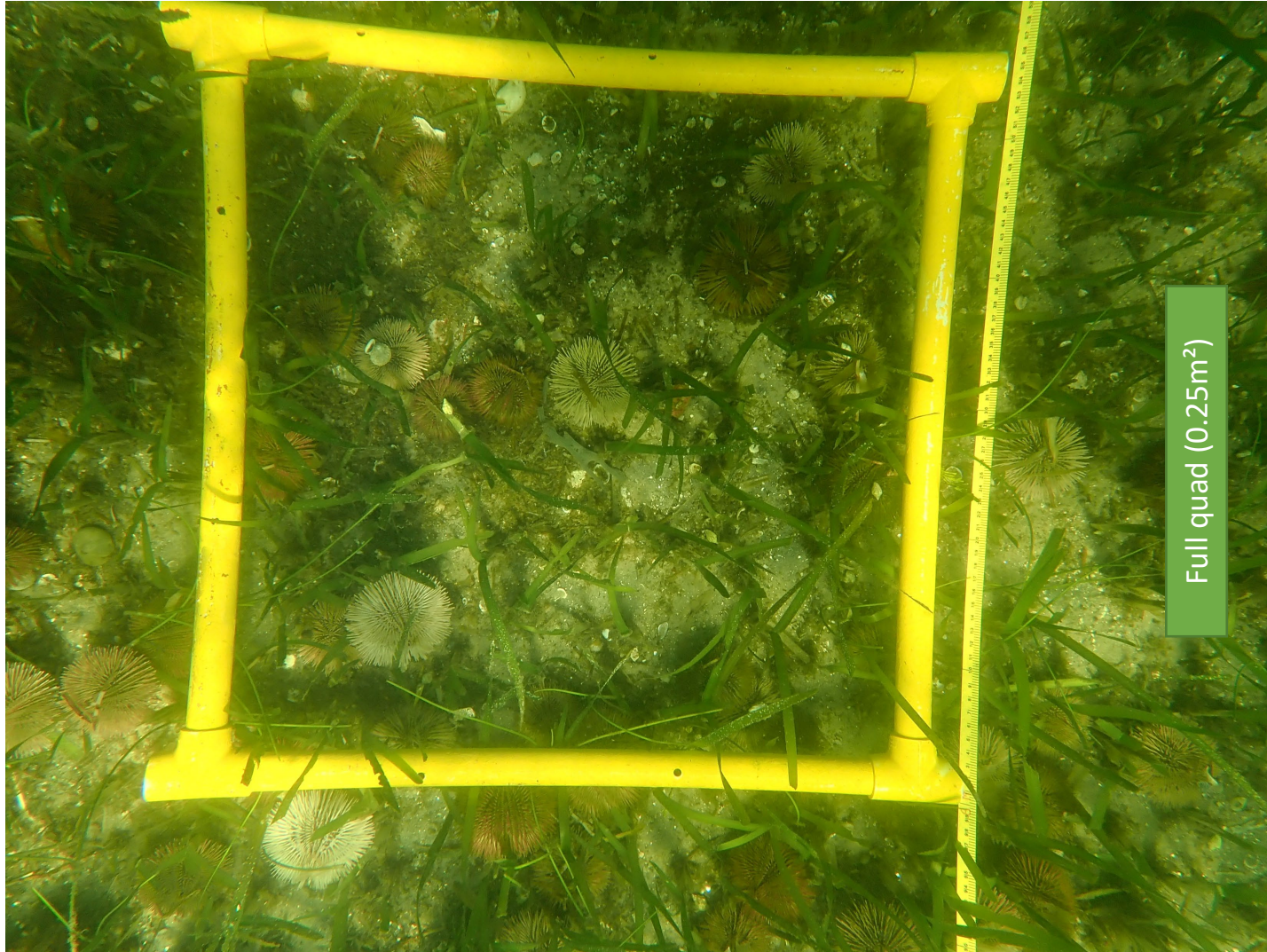
Another view of the previous slide. In the red circle is site US01 and we completed USU10 at the same coordinates to track any changes in that area.

Urchin Survey Quad 7

USU07

GPS:29.80432, -83.6233

Date: 04/20/2023

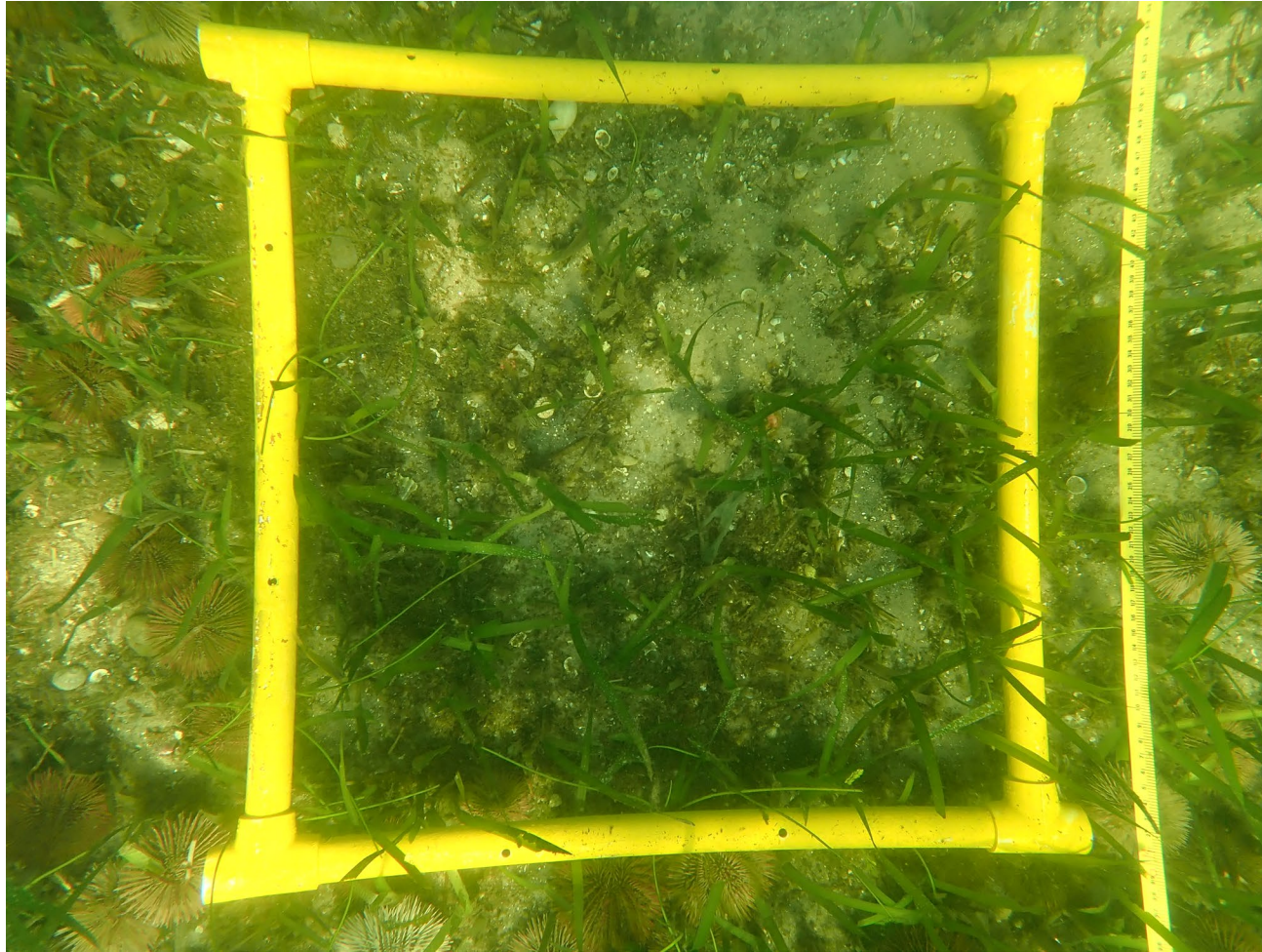


Urchin Survey Quad 7

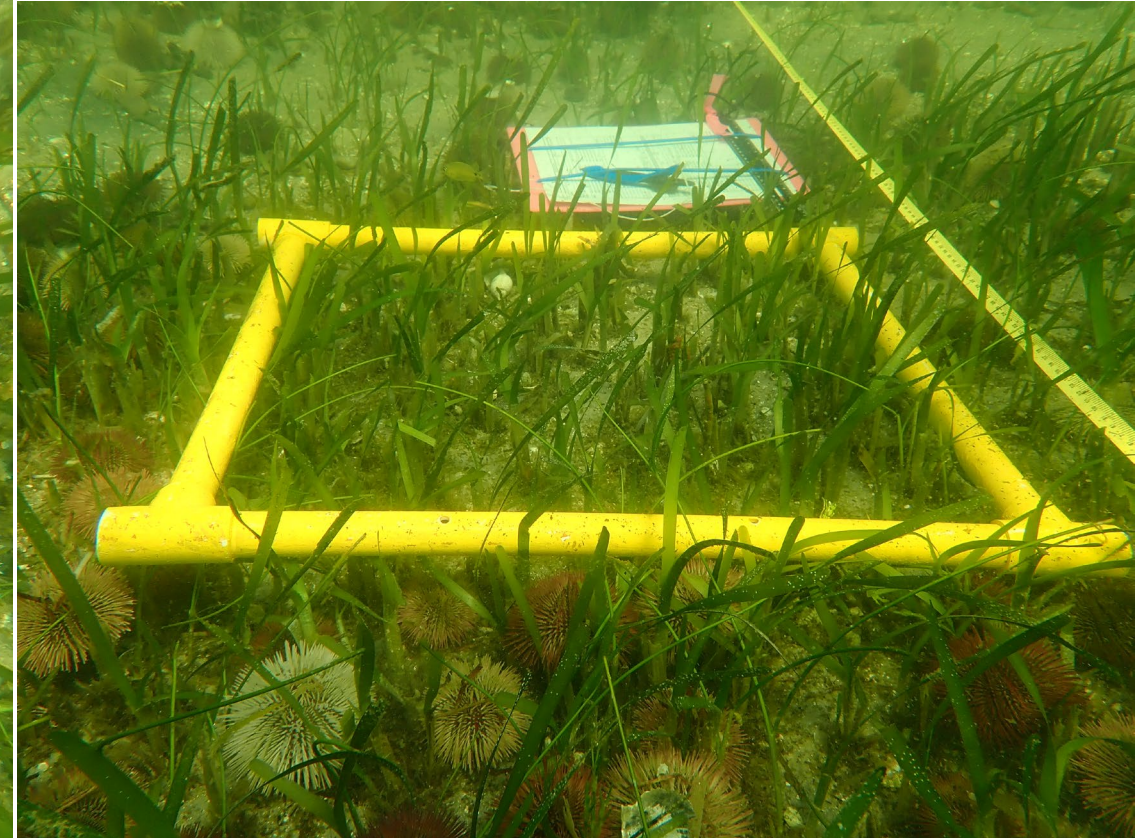
USU07

GPS:29.80432, -83.6233

Date: 04/20/2023



Full quad (0.25m²)



Urchin density in
area around USU07

Urchin Survey Quad 7

USU07

GPS:29.80432, -83.6233

Date: 04/20/2023

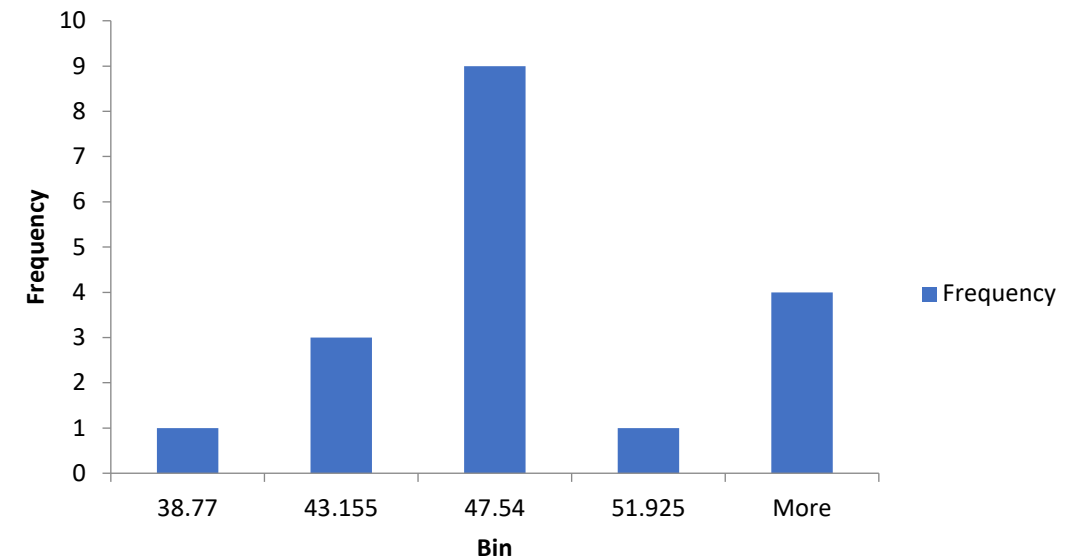
Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHIN S	SCALLOP S	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYT E_DENSITY	SEDIMENT_TYPE	Rhizomes
4/20/2023	USU07	Urchin	TTES	25	24.9	23.5	14	18	0	Grass	28	27	1	Light	Sand Mud Shell	Yes
4/20/2023	USU07	Urchin	SFIL	2	30.5	17.2	11.4			Grass						
4/20/2023	USU07	Urchin	HINC	1						Algae						

Temp	DO (mg/L/)	Salinity	pH
22.39	7.77	32.26	8.26

Mean Diameter (mm)	46.15944444
Standard Deviation	4.880685188
Range	17.54
Minimum Diameter (mm)	38.77
Maximum Diameter (mm)	56.31
Total Urchin Count	18

Note: urchin diameter measured transversally, test to test

USU07 Urchin Test Diameters (mm)



Urchin Survey Quad 8

USU08

GPS: 29.80408, -83.6225

Date: 05/16/2023

Full quad (0.25m²)



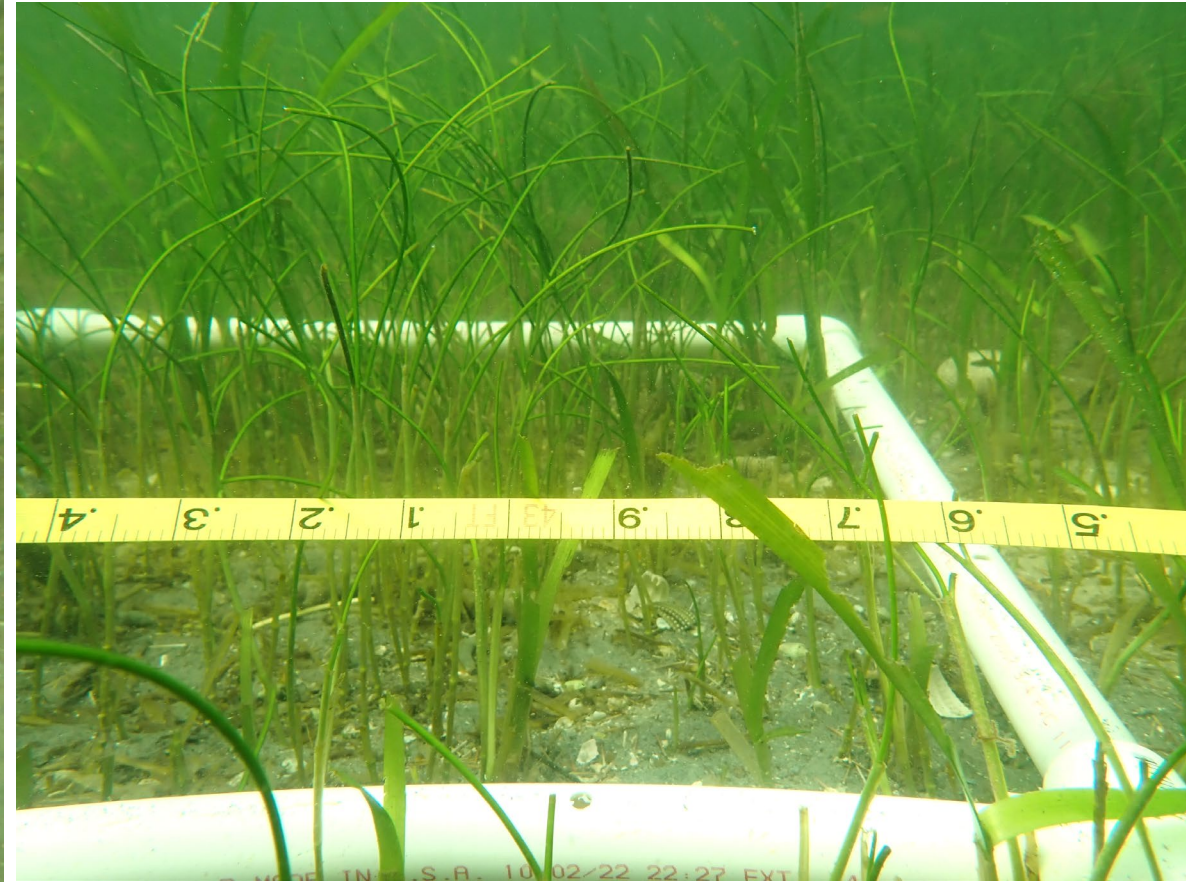
Closer view of dead
urchin tests mixed in
with living urchins

Urchin Survey Quad 8

USU08

GPS: 29.80408, -83.6225

Date: 05/16/2023



Full quad (0.25m²)

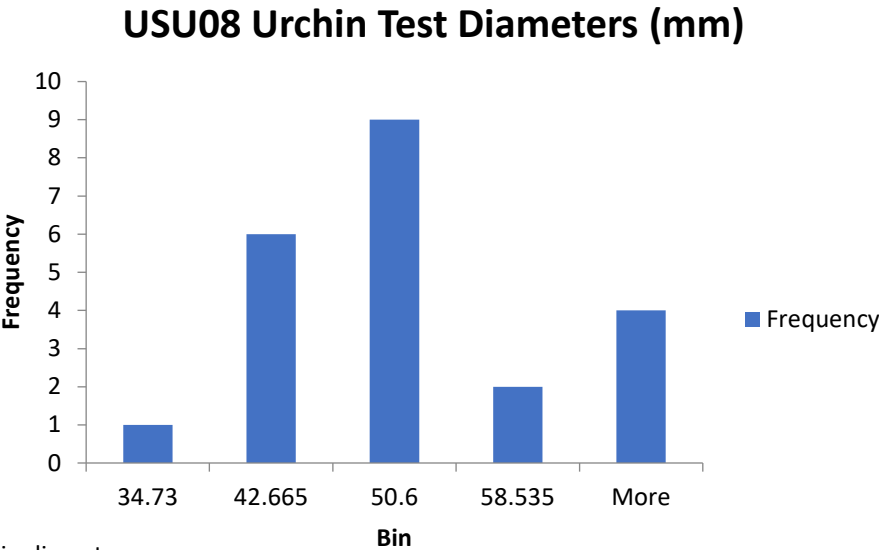
Urchin Survey Quad 8

USU08
GPS: 29.80408, -83.6225
Date: 05/16/2023

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTETYPE	SEDIMENT_TYPES	Rhizomes
5/16/2023	USU08	Urchin	TTES	5	11.8	27.5	28.9	22	0	Grass	18	17	1	Clean	Sand Mud Shell	Yes
5/16/2023	USU08	Urchin	SFIL	12	30.4	16.7	27.8			Grass						
5/16/2023	USU08	Urchin	HINC	1						Algae						

Temp	DO (mg/L/)	Salinity	pH
27.6	5.92	32.18	8.25

Mean Diameter (mm)	48.34636
Standard Deviation	8.738806
Range	31.74
Minimum Diameter (mm)	34.73
Maximum Diameter (mm)	66.47
Total Urchin Count	22



Note: urchin diameter measured transversally, test to test

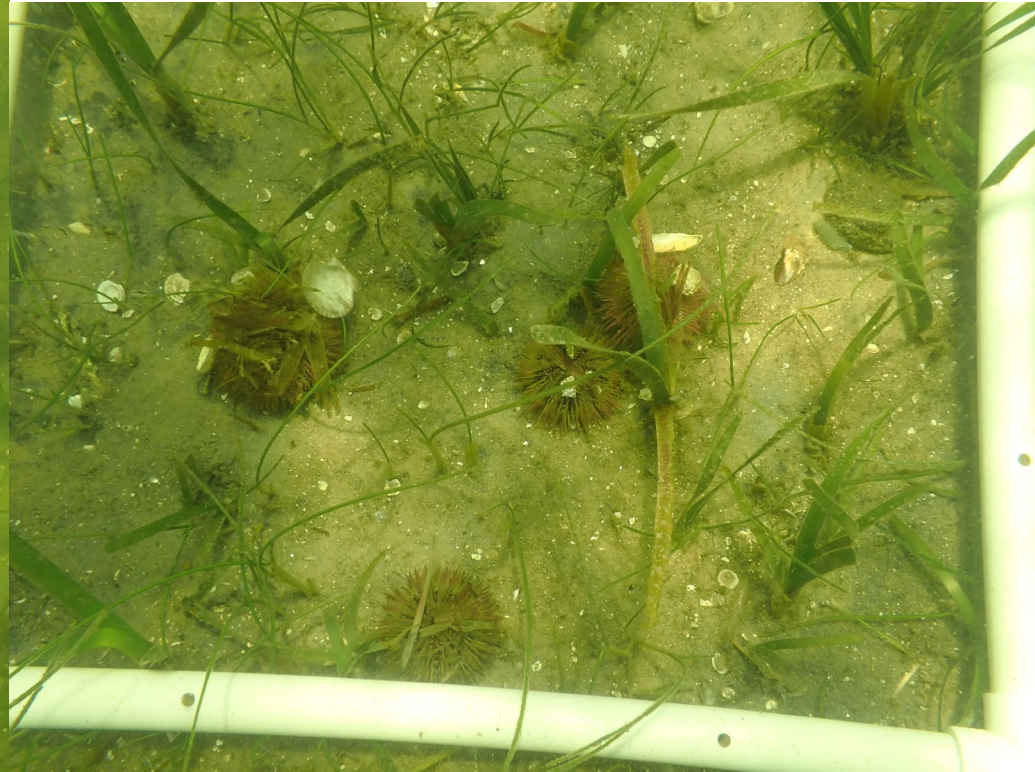
Urchin Survey Quad 9

USU09

GPS:29.80662, -83.622

Date: 5/16/2023

Full quad (0.25m²)



Closeup

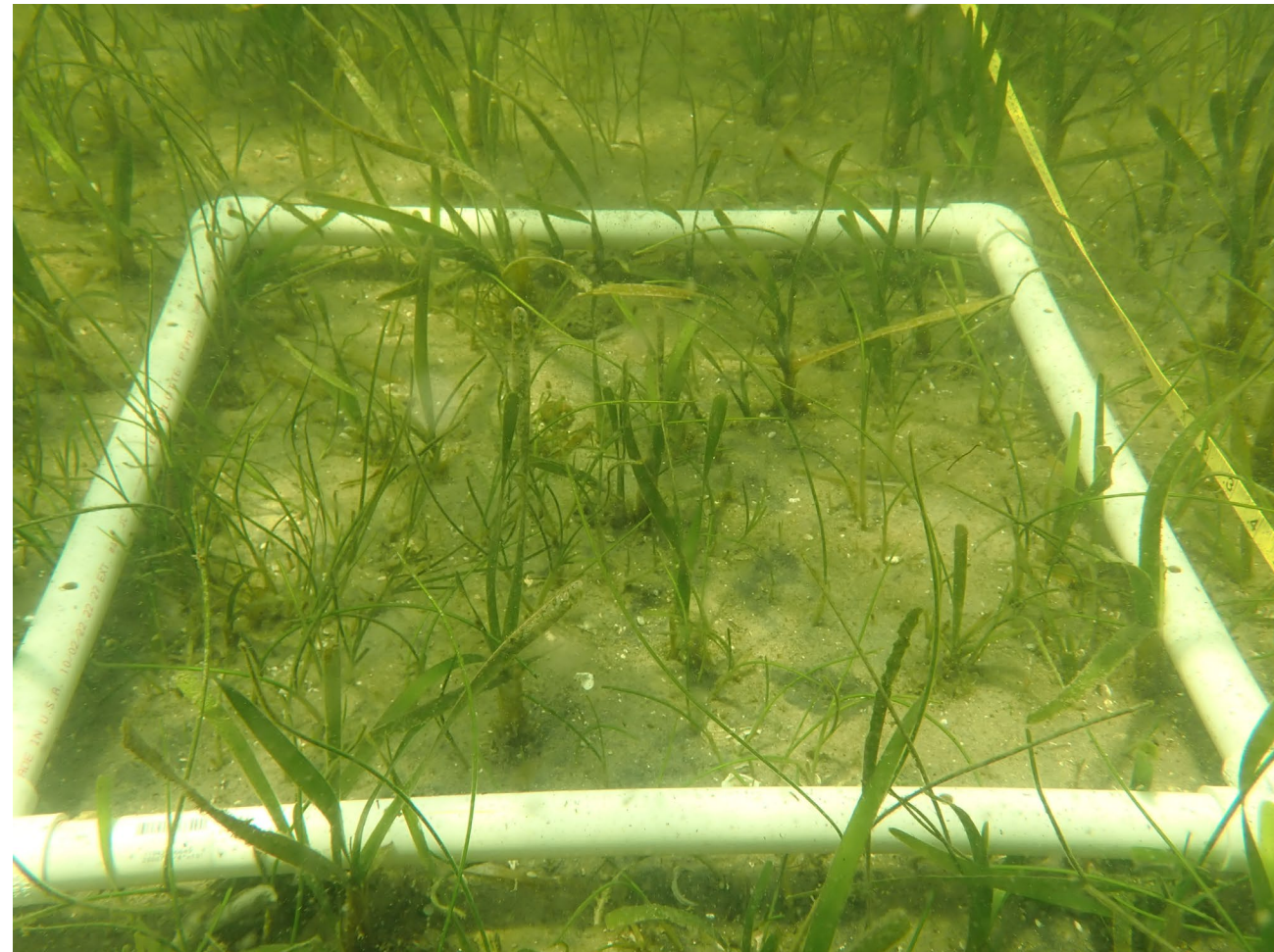
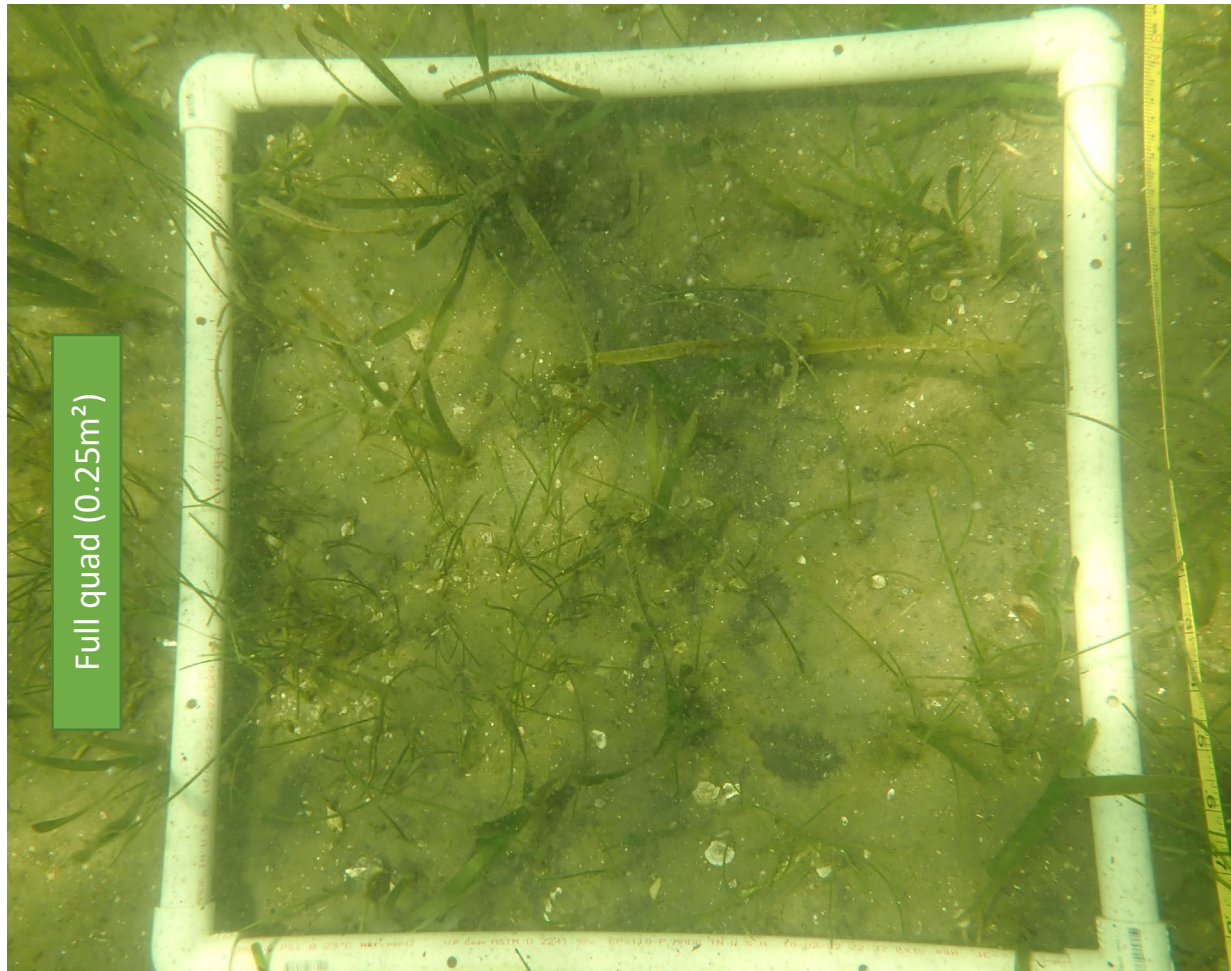
Urchin Survey Quad 9

USU09

GPS:29.80662, -83.622

Date: 5/16/2023

Full quad (0.25m²)



Urchin Survey Quad 9

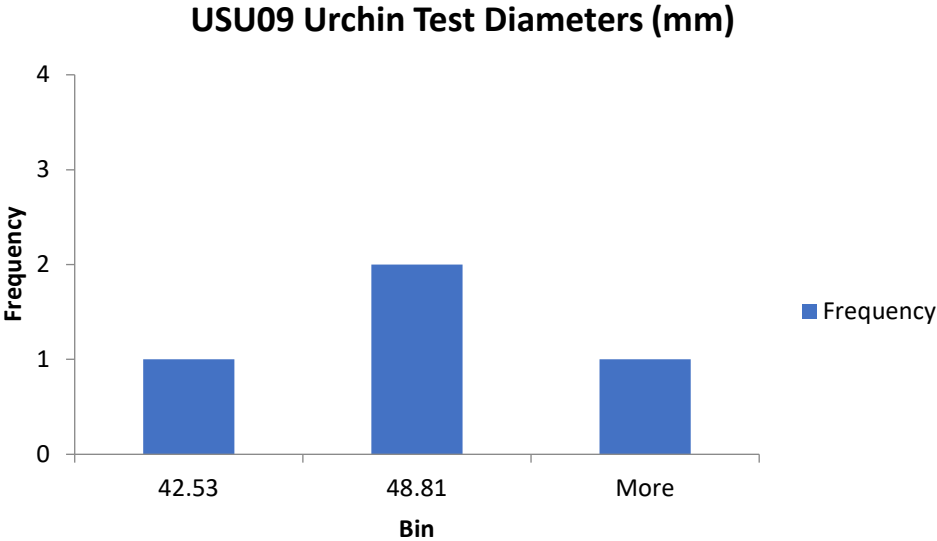
USU09
GPS:29.80662, -83.622
Date: 5/16/2023

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHIN S	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYT E_DENSITY	SEDIMENT_TYPE	Rhizomes
5/16/2023	USU09	Urchin	TTES	6	20.3	15.1	12.5	4	0	Grass	14	14		Clean	Sand Mud Shell	Yes
5/16/2023	USU09	Urchin	SFIL	5	14.9	9.9	23			Grass						
5/16/2023	USU09	Urchin	HWRI	3	8.1	4.6	13.9			Grass						

Temp	DO (mg/L/)	Salinity	pH
28	5.75	32.14	8.24

Mean Diameter (mm)	46.6175
Standard Deviation	5.919918
Range	12.56
Minimum Diameter (mm)	42.53
Maximum Diameter (mm)	55.09
Total Urchin Count	4

Note: urchin diameter measured transversally, test to test



Urchin Survey Quad 10

USU10

GPS:29.80818, -83.6242

Date: 5/16/2023

Full quad (0.25m²)



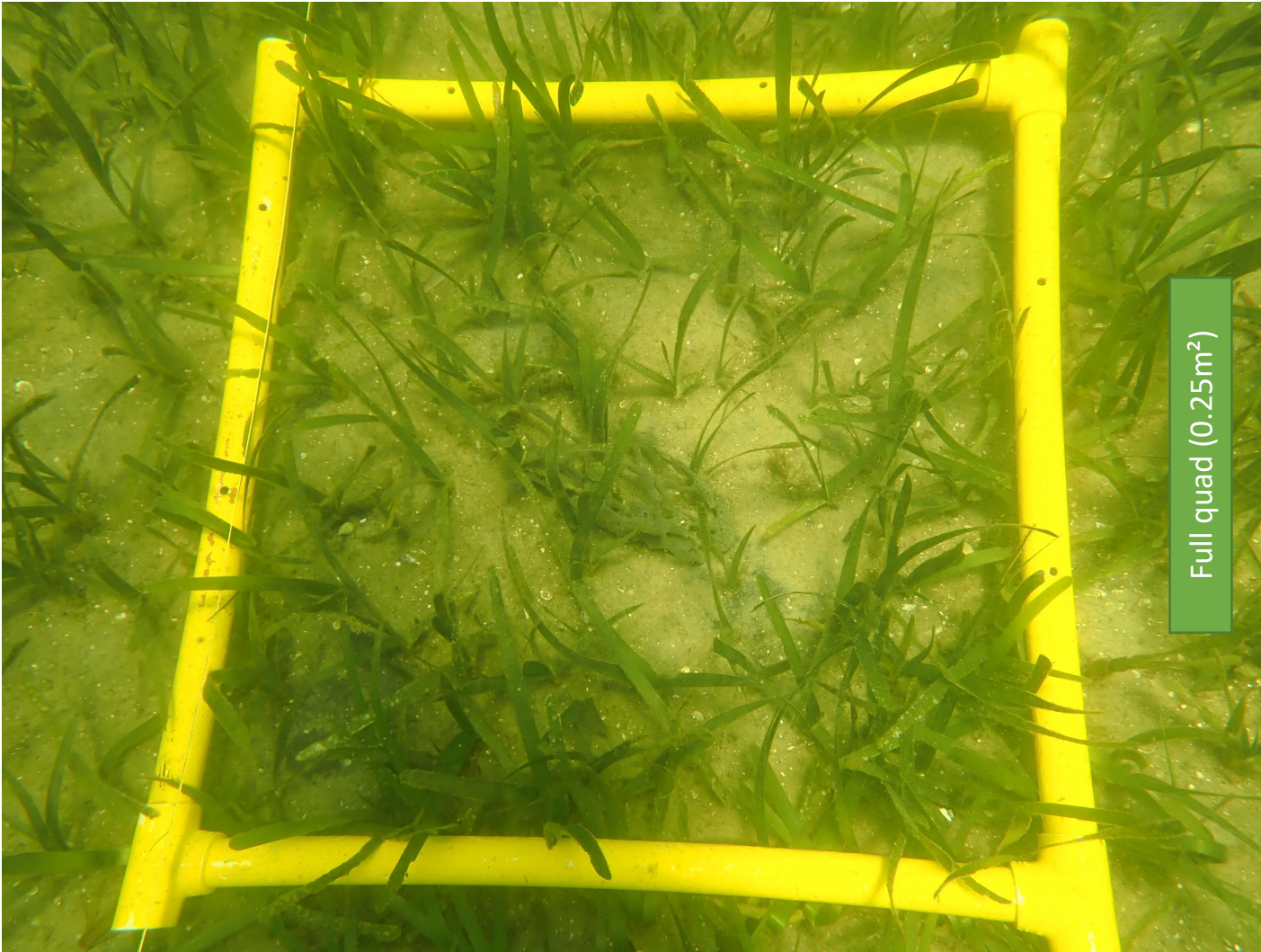
Closeup

Urchin Survey Quad 10

USU10

GPS:29.80818, -83.6242

Date: 5/16/2023



Full quad (0.25m²)



Closeup

Urchin Survey Quad 10

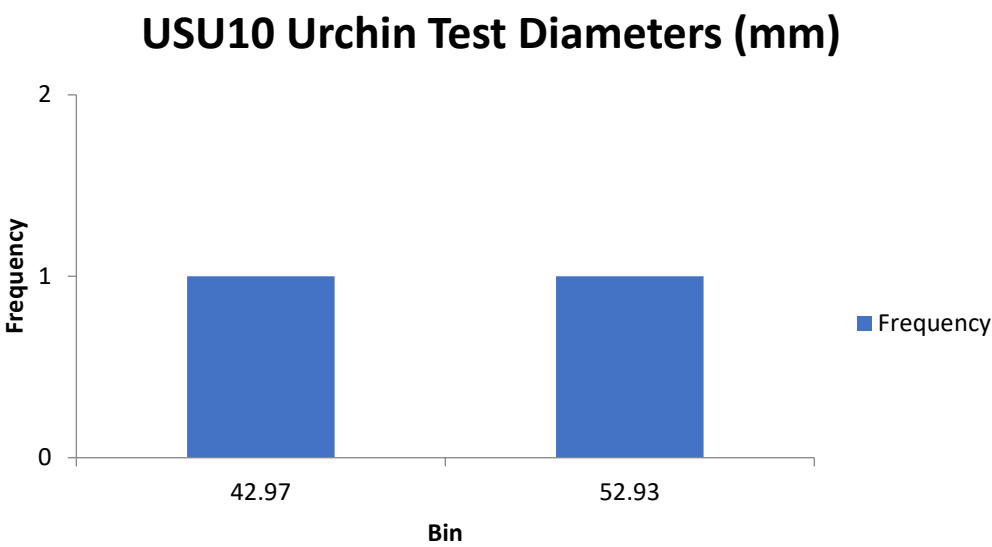
USU10
GPS:29.80818, -83.6242
Date: 5/16/2023

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHIN_S	SCALLOP_S	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYT_DENSITY	SEDIMENT_TYPES	Rhizomes
5/16/2023	USU10	Urchin	TTES	22	22.1	20.1	24.1	2	0	Grass	23	23	0	Clean	Sand Mud Shell	Yes
5/16/2023	USU10	Urchin	HWRI	1	10.3	3.1				Grass						

Temp	DO (mg/L/)	Salinity	pH
28.3	6.58	28.3	8.27

Mean Diameter (mm)	47.95
Standard Deviation	7.042784
Range	9.96
Minimum Diameter (mm)	42.97
Maximum Diameter (mm)	52.93
Total Urchin Count	2

Note: urchin diameter measured transversally, test to test



Sample site US01 compared to US10

Fig. 1 US01 and US10 Total Urchin Counts by Type

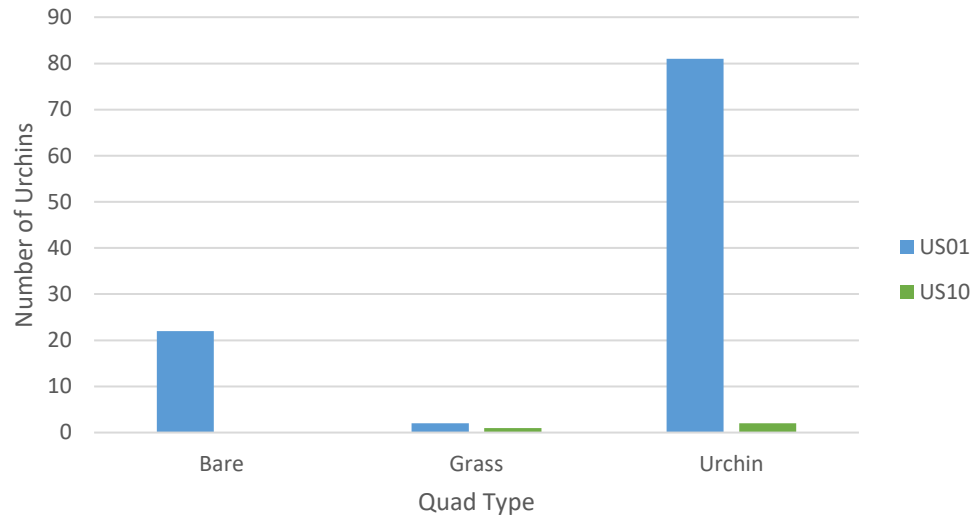


Fig. 2 US01 and US10 Seagrass Percent Cover

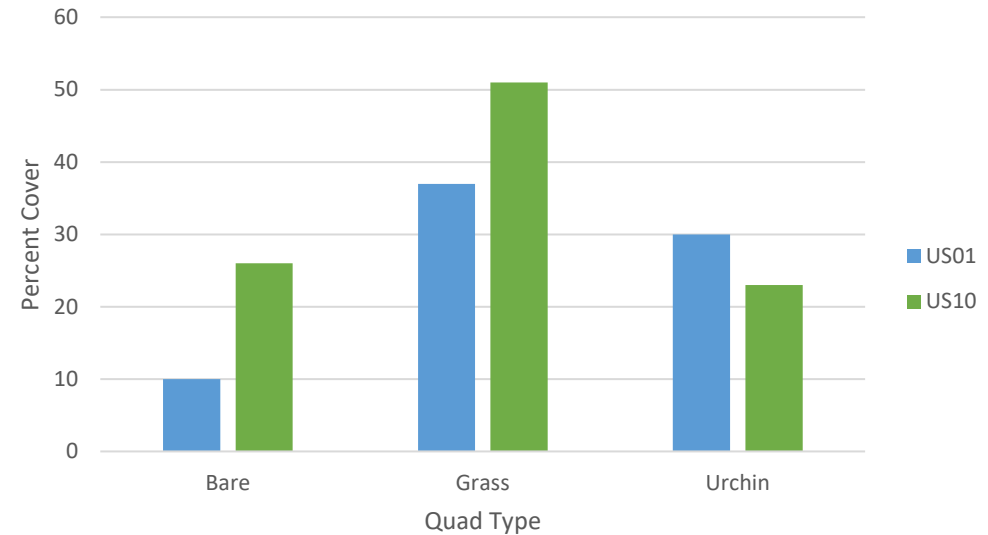


Fig. 3 US01 and US10 Average Seagrass Canopy Height (mm)

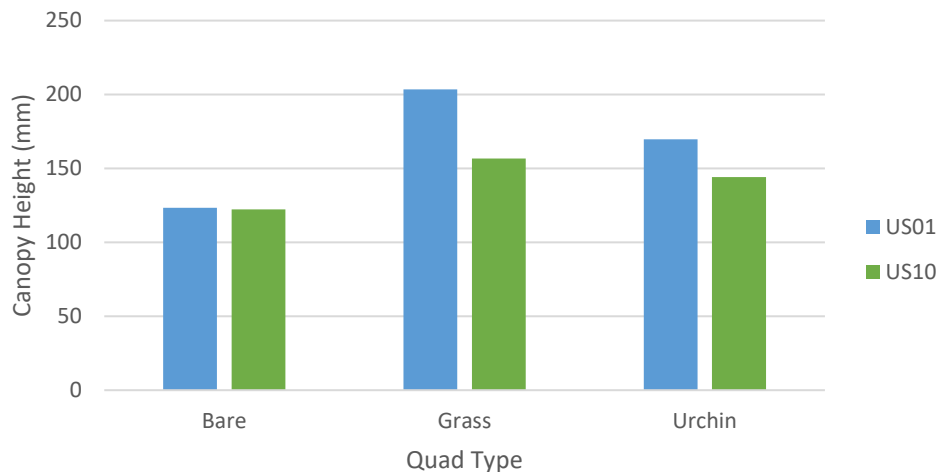


Figure 1: Urchins present in each quadrat at time of sampling event. Significantly lower in May at US10 than US01 in February. Figure 2: Total seagrass percent cover for each quadrat, more seagrass at US10 compared to US01 for bare and grass. Less grass cover in the urchin quad for US10 than US01. Figure 3: Average canopy height of all seagrass species present in quadrat, though the US10 bare has an increase in percent cover the seagrass height has yet to increase.

Note: cannot use urchin size for comparisons as US01 tests were measured spine-spine rather than test-test.

Sample site US01 compared to US10:

Raw data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
2/8/2023	USB01	Bare	TTES	10	12	16	9	22	0	Grass	10	10	0	Heavy	Sand Mud Shell	Yes
5/16/2023	USB10	Bare	TTES	20	19	20.5	24	0	0	Grass	26	26	0	Clean	Sand Mud Shell	Yes
5/16/2023	USB10	Bare	HWRI	5	12	6	12.5			Grass						
5/16/2023	USB10	Bare	SFIL	1	7	5	4			Grass						
2/8/2023	USG01	Grass	TTES	27	26	21	18	2	0	Grass	37	37	0	Heavy	Sand Mud Shell	Yes
2/8/2023	USG01	Grass	SFIL	8	23	22	11			Grass						
2/8/2023	USG01	Grass	HWRI	2	25	21	16			Grass						
5/16/2023	USG10	Grass	SFIL	1	13	4.5	16	1	0	Grass	51	51	0	Light	Sand Mud Shell	Yes
5/16/2023	USG10	Grass	TTES	50	23.5	17	20			Grass						
2/8/2023	USU01	Urchin	TTES	25	20.5	9.1	15.2	81	0	Grass	30	30	0	Moderate	Sand Mud Shell	Yes
2/8/2023	USU01	Urchin	SFIL	5	24	27	6			Grass						
5/16/2023	USU10	Urchin	TTES	22	22.1	20.1	24.1	2	0	Grass	23	23	0	Clean	Sand Mud Shell	Yes
5/16/2023	USU10	Urchin	HWRI	1	10.3	3.1				Grass						

Urchin quads by the numbers

	Measured Test-Test	
	survey site	data
most urchins	USU04	196 urchins
widest range	USU04	34.56
smallest standard deviation	USU05	4.501674
largest average diameter (mm)	USU08	48.34636
smallest average diameter (mm)	USU06	40.01729
largest maximum diameter (mm)	USU04	68.25
smallest minimum diameter (mm)	USU06	31.5

	Measured spine-spine	
	survey site	data
widest range	USU02	42.68
smallest standard deviation	USU01	4.946864523
largest average diameter (mm)	USU03	66.64226415
smallest average diameter (mm)	USU02	55.82704403
largest maximum diameter (mm)	USU03	86.55
smallest minimum diameter (mm)	USU02	43.85

Test-test vs Spine-spine measurements

Location	Urchin_spine (mm)	Urchin_test (mm)	difference
USU04	57.95	40.01	17.94
USU04	74.15	54.36	19.79
USU04	62.11	48.06	14.05
USU04	67.29	48.81	18.48
USU04	65.86	45.61	20.25
USU04	65.5	49.42	16.08
USU04	64.71	49.08	15.63
USU04	64.57	45.59	18.98
USU04	65.68	47.61	18.07
USU04	60.25	46.01	14.24

Average	17.351
St.Dev	2.104692
ST.err	0.701564
Av.Dev	1.8808

During the February surveys, urchins were measured spine to spine. For best science practices this was changed to test-test measurements in march. We measured 10 urchins both ways to see if we could figure out a way to adjust the February urchin measurements. The difference was found between the two measurements and descriptive statistics performed. They were similar in ranges, so individual spine size was estimated by halving the difference. The sample size is small and the urchins recorded at USU4 were similar in size so this method was not utilized since it would not be representative. Including it here if anyone is interested. Will try to collect more spine measurements in the future.

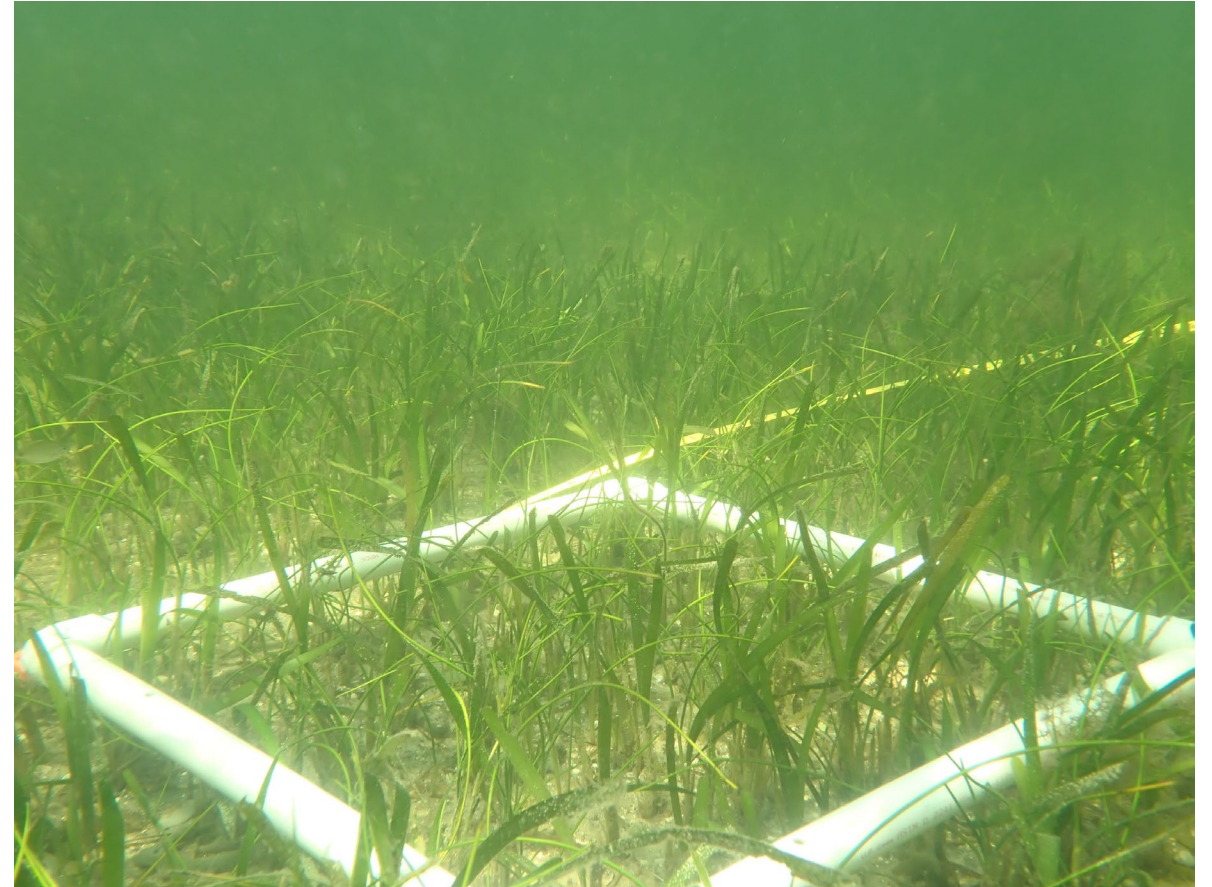
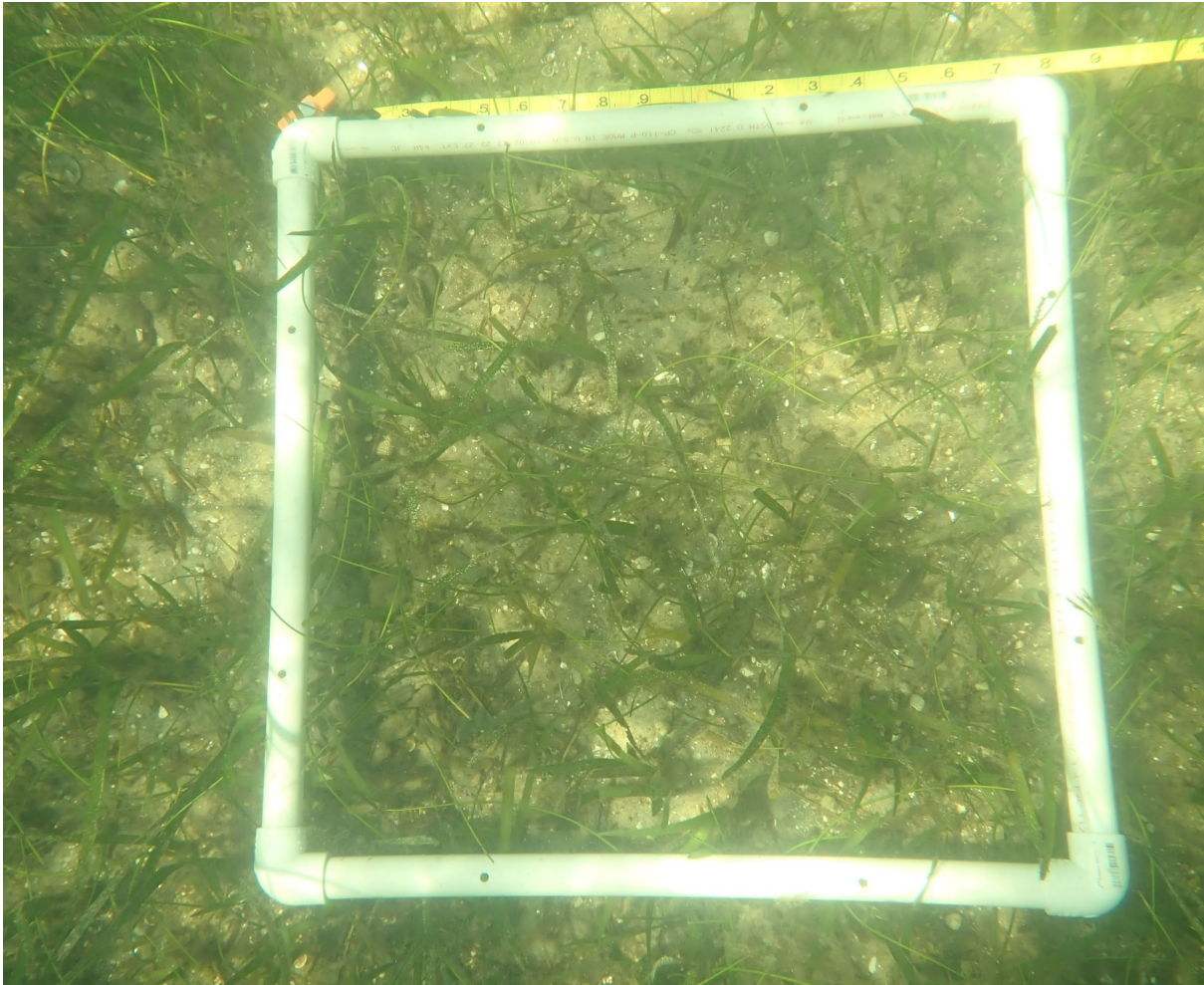
difference	estimated spine
17.94	8.97
19.79	9.895
14.05	7.025
18.48	9.24
20.25	10.125
16.08	8.04
15.63	7.815
18.98	9.49
18.07	9.035
14.24	7.12
Average	8.6755
St.Dev	1.052346
ST.err	0.350782
Av.Dev	0.9404

Urchin Survey Grass Quad

USG07

GPS:29.80429, -83.6233

Date: 4/20/2023



Urchin Survey Grass Quad

USG07
GPS:29.80429, -83.6233
Date: 4/20/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHIN S	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTES	SEDIMENT_TYPE	Rhizomes
4/20/2023	USG07	Grass	TTES	20	24.3	22.4	17	0	0	Grass	30	30	0	Light	Sand Mud Shell	Yes
4/20/2023	USG07	Grass	SFIL	1	19.2	17	27.4			Grass						

Temp	DO (mg/L/)	Salinity	pH
22.39	7.77	32.26	8.26

Urchin Survey Grass Quad

USG08

GPS:29.80406, -83.6223

Date:5/16/2023



Urchin Survey Grass Quad

USG08

GPS:29.80406, -83.6223

Date:5/16/2023

Data

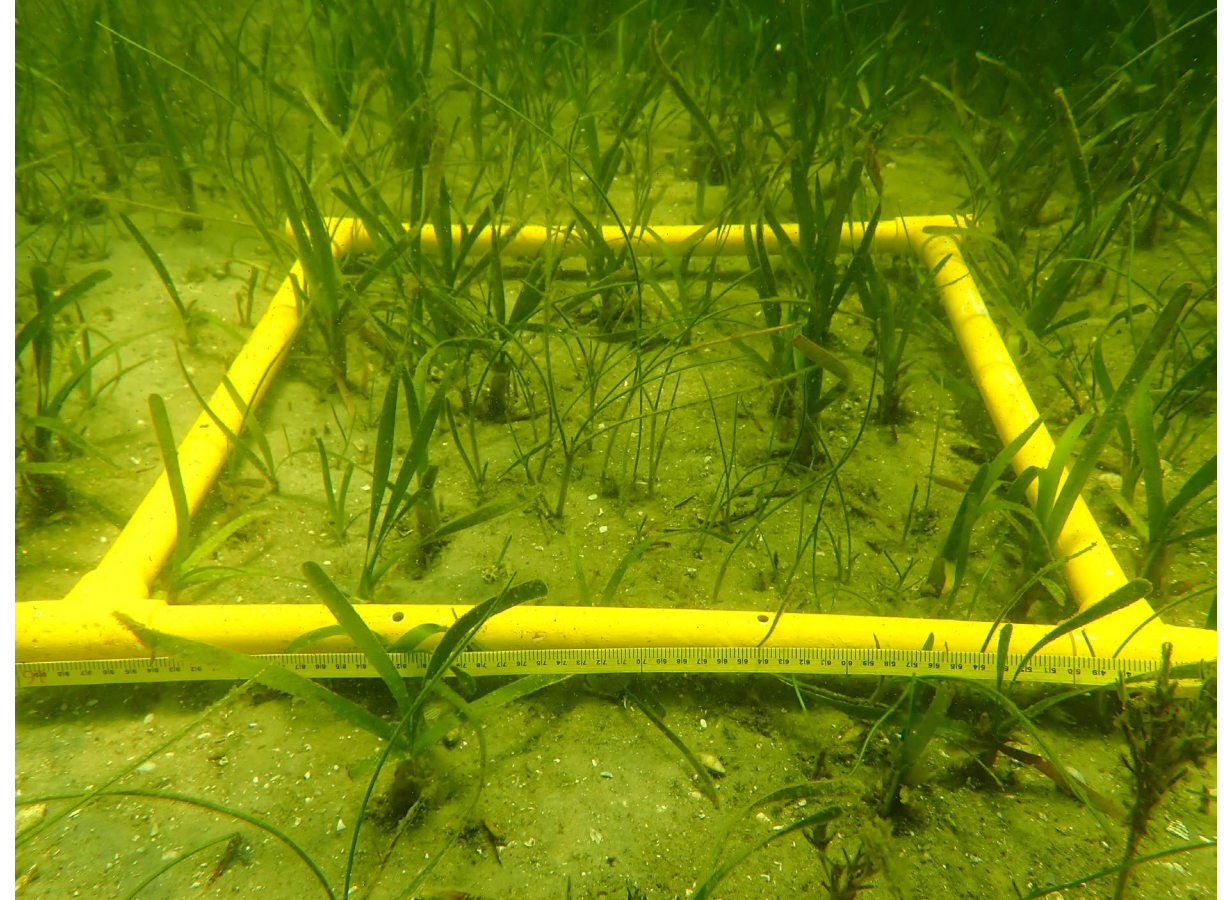
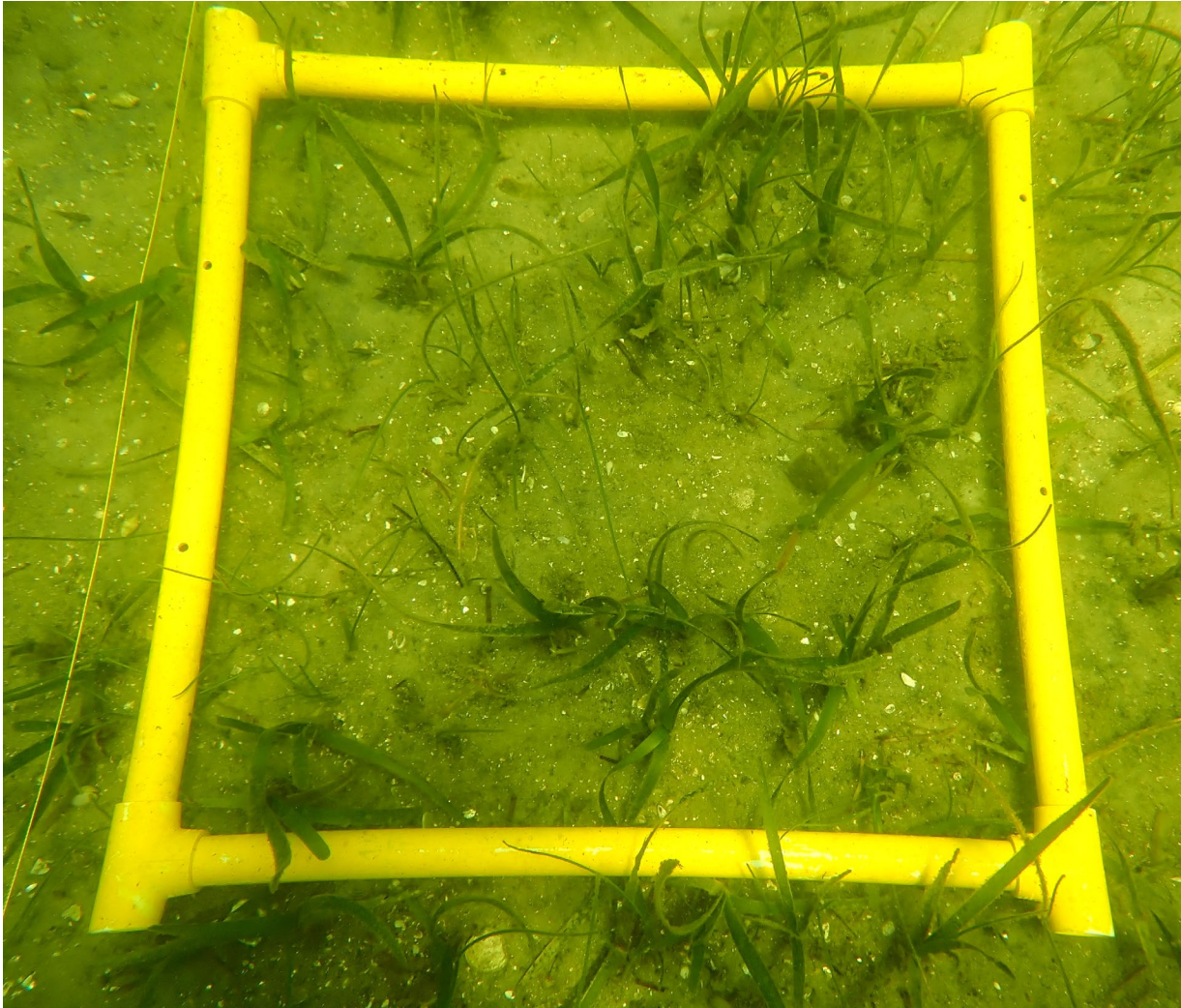
[illegible]

Urchin Survey Grass Quad

USG09

GPS:29.80669, -83.622

Date: 5/16/2023



Urchin Survey Grass Quad

USG09
GPS:29.80669, -83.622
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTES_DENSITY	SEDIMENT_TYPE	Rhizomes
5/16/2023	USG09	Grass	TTES	12	21	15	20.5	0	0	Grass	22	22	0	Clean	Sand Mud Shell	Yes
5/16/2023	USG09	Grass	SFIL	10	29	22	17			Grass						

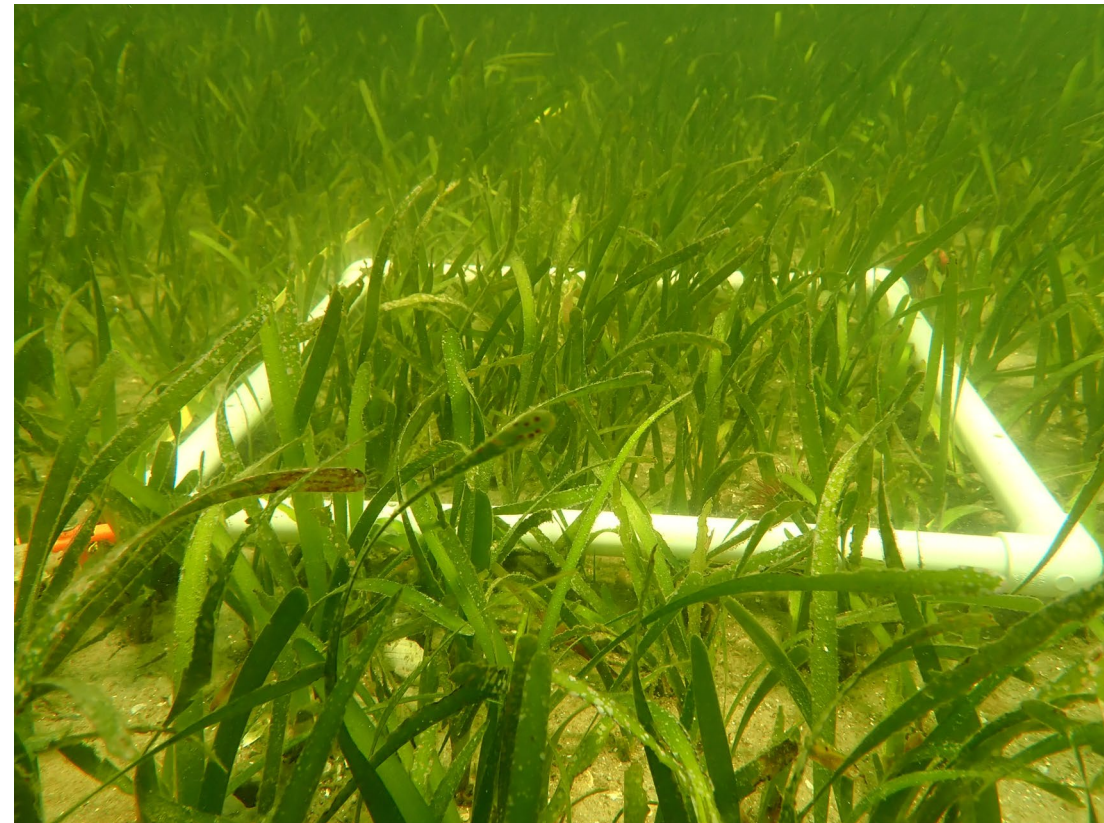
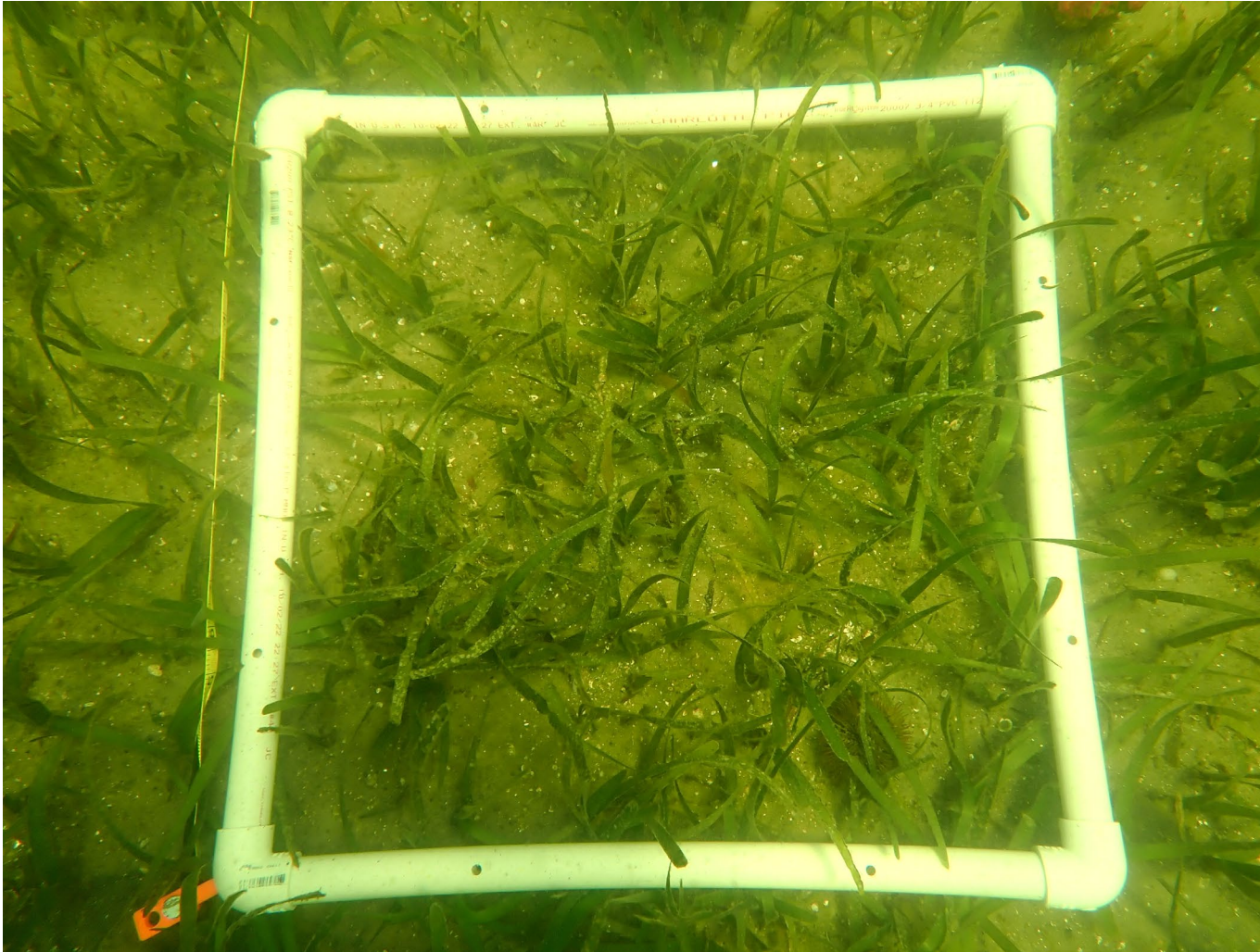
Temp	DO (mg/L)	Salinity	pH
28	5.75	32.14	8.24

Urchin Survey Grass Quad

USG10

GPS:29.80812, -83.6241

Date: 5/16/2023



Urchin Survey Grass Quad

USG10
GPS:29.80812, -83.6241
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHIN S	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTITE_DENSITY	SEDIMENT_TYPE	Rhizomes
5/16/2023	USG10	Grass	SFIL	1	13	4.5	16	1	0	Grass	51	51	0	Light	Sand Mud Shell	Yes
5/16/2023	USG10	Grass	TTES	50	23.5	17	20			Grass						

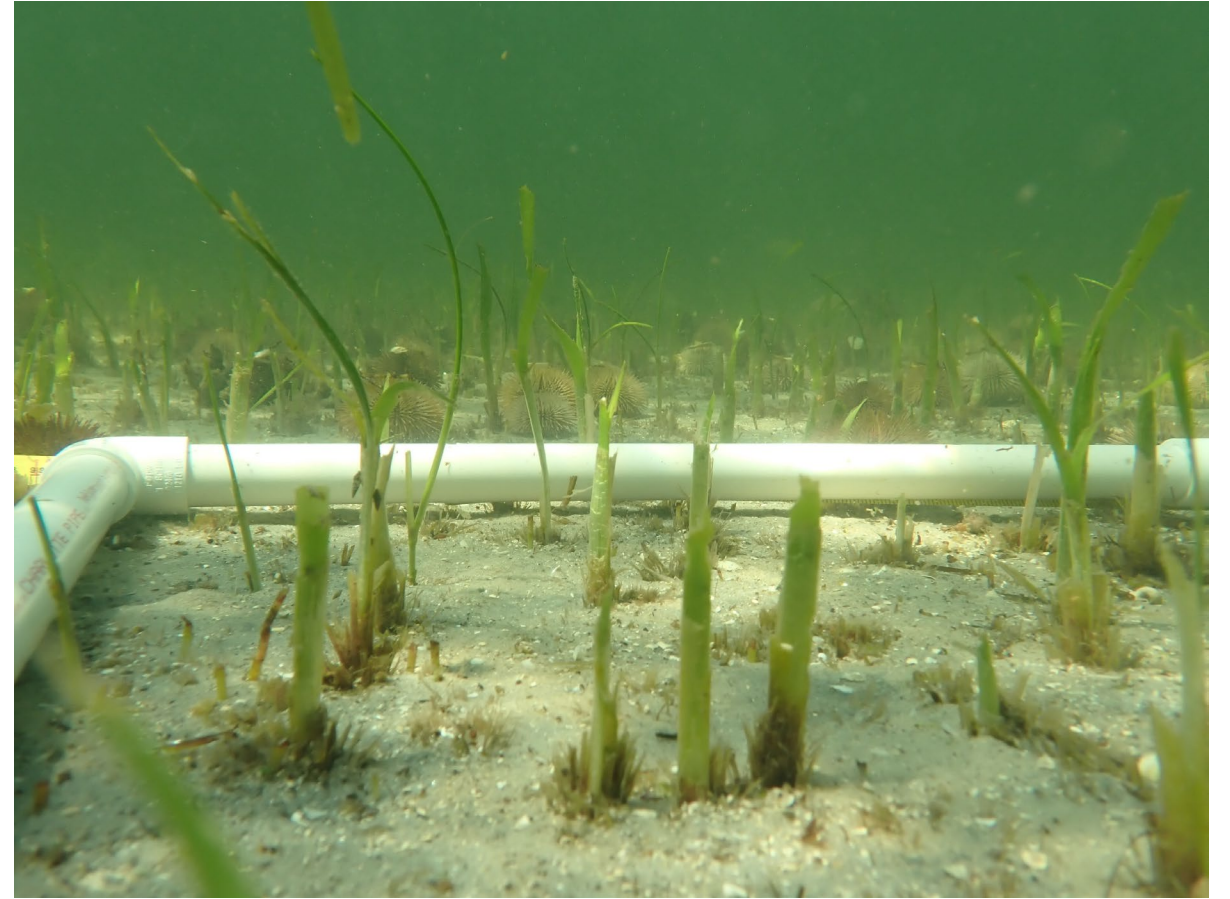
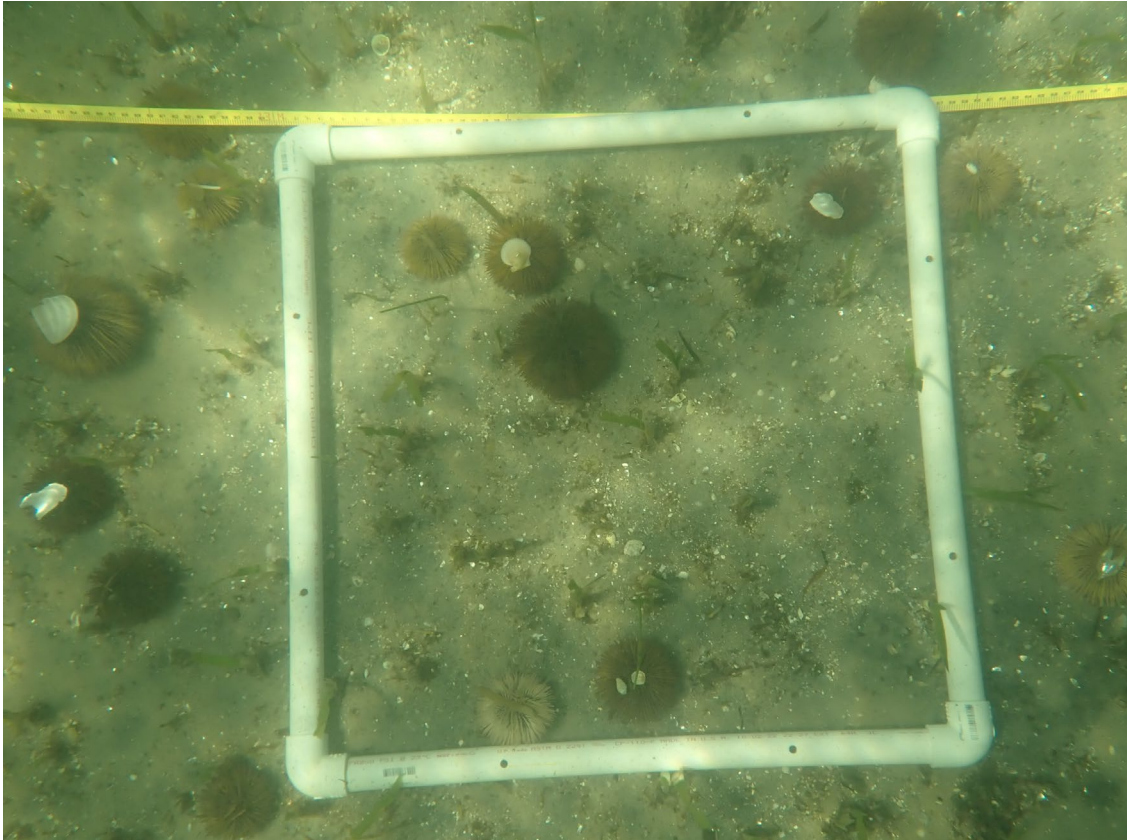
Temp	DO (mg/L/)	Salinity	pH
28.3	6.58	28.3	8.27

Urchin Survey Bare Quad

USB07

GPS:29.80437, -83.6233

Date: 5/16/2023



Urchin Survey Bare Quad

USB07
GPS:29.80437, -83.6233
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTETYPE	SEDIMENT_TYPE	Rhizomes
4/20/2023	USB07	Bare	TTES	5	6.8	15	8.5	6	0	Grass	6	6	0	Light	Sand Mud Shell	Yes
4/20/2023	USB07	Bare	SFIL	1	8.9	21.4	18			Grass						

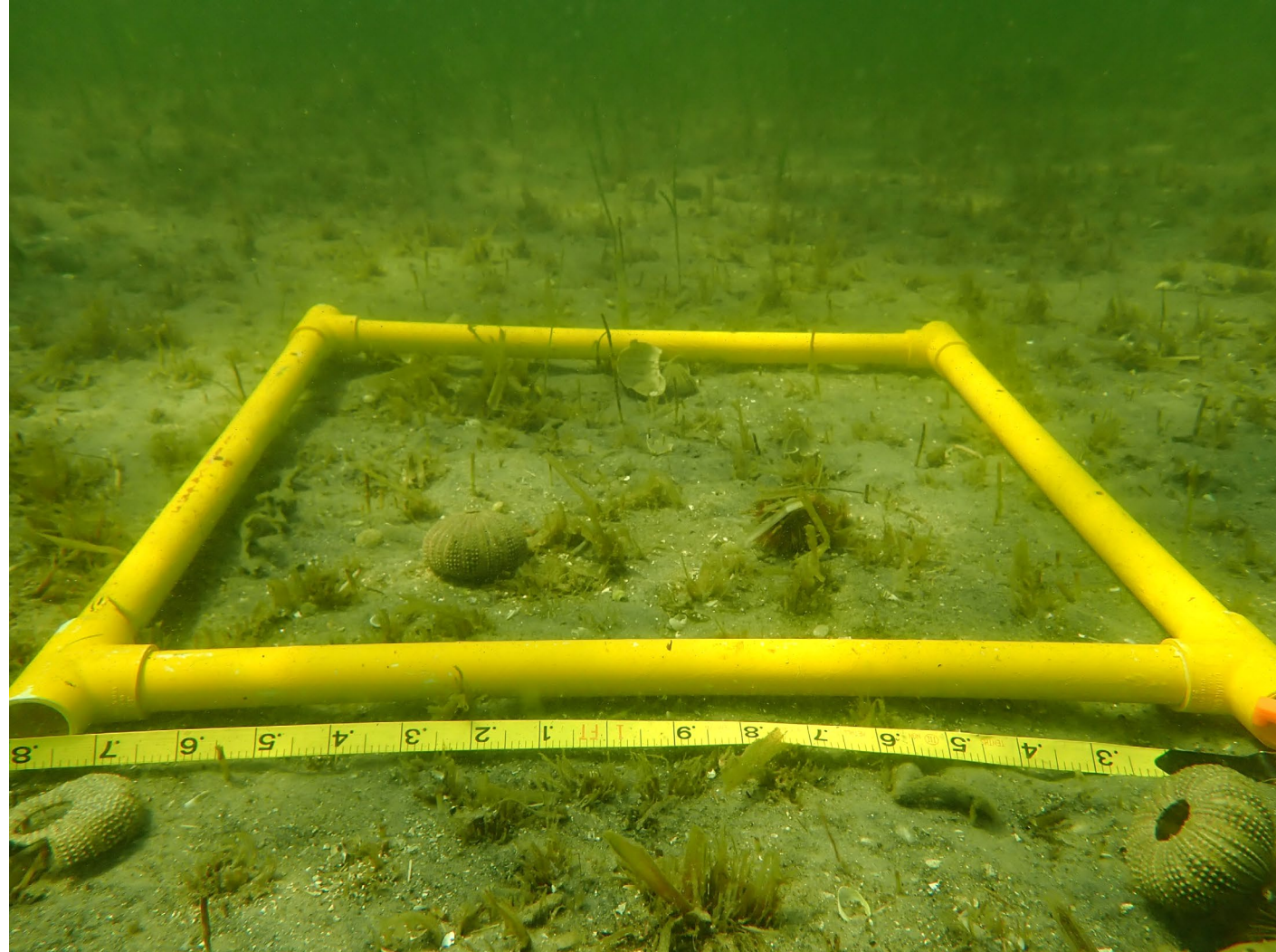
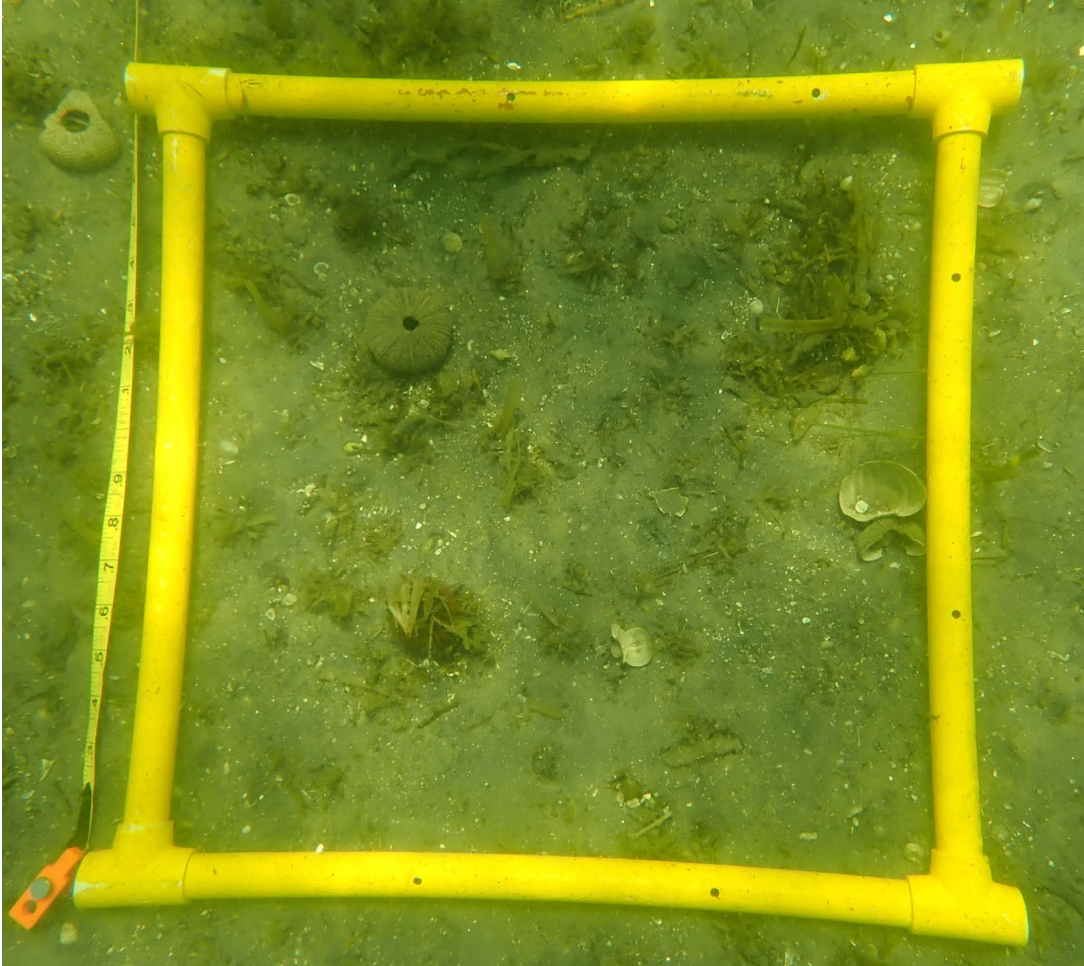
Temp	DO (mg/L/)	Salinity	pH
22.39	7.77	32.26	8.26

Urchin Survey Bare Quad

USB08

GPS:29.80412, -83.6226

Date: 5/16/2023



Urchin Survey Bare Quad

USB08
GPS:29.80412, -83.6226
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTETYPE	SEDIMENT_TYPE	Rhizomes
5/16/2023	USB08	Bare	TTES	1	2.5			1		0Grass	2	2		0Clean	Sand Mud Shell	Yes
5/16/2023	USB08	Bare	SFIL	1	3.5	13	4			Grass						

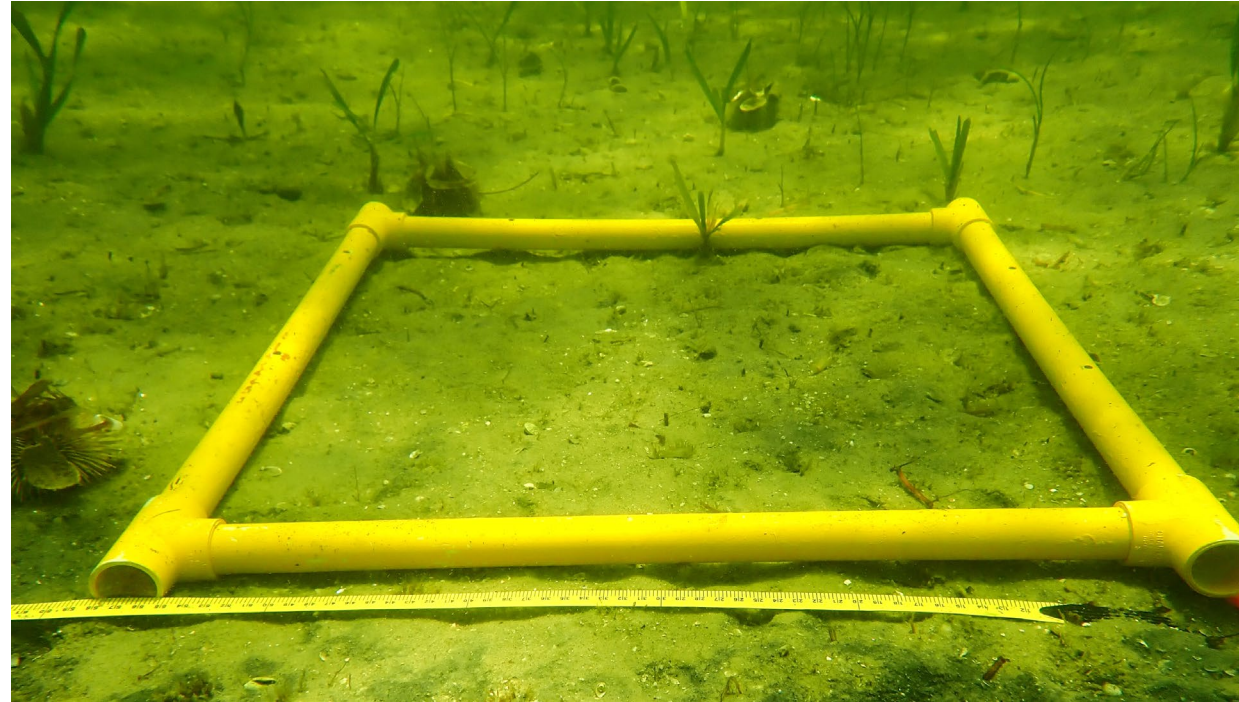
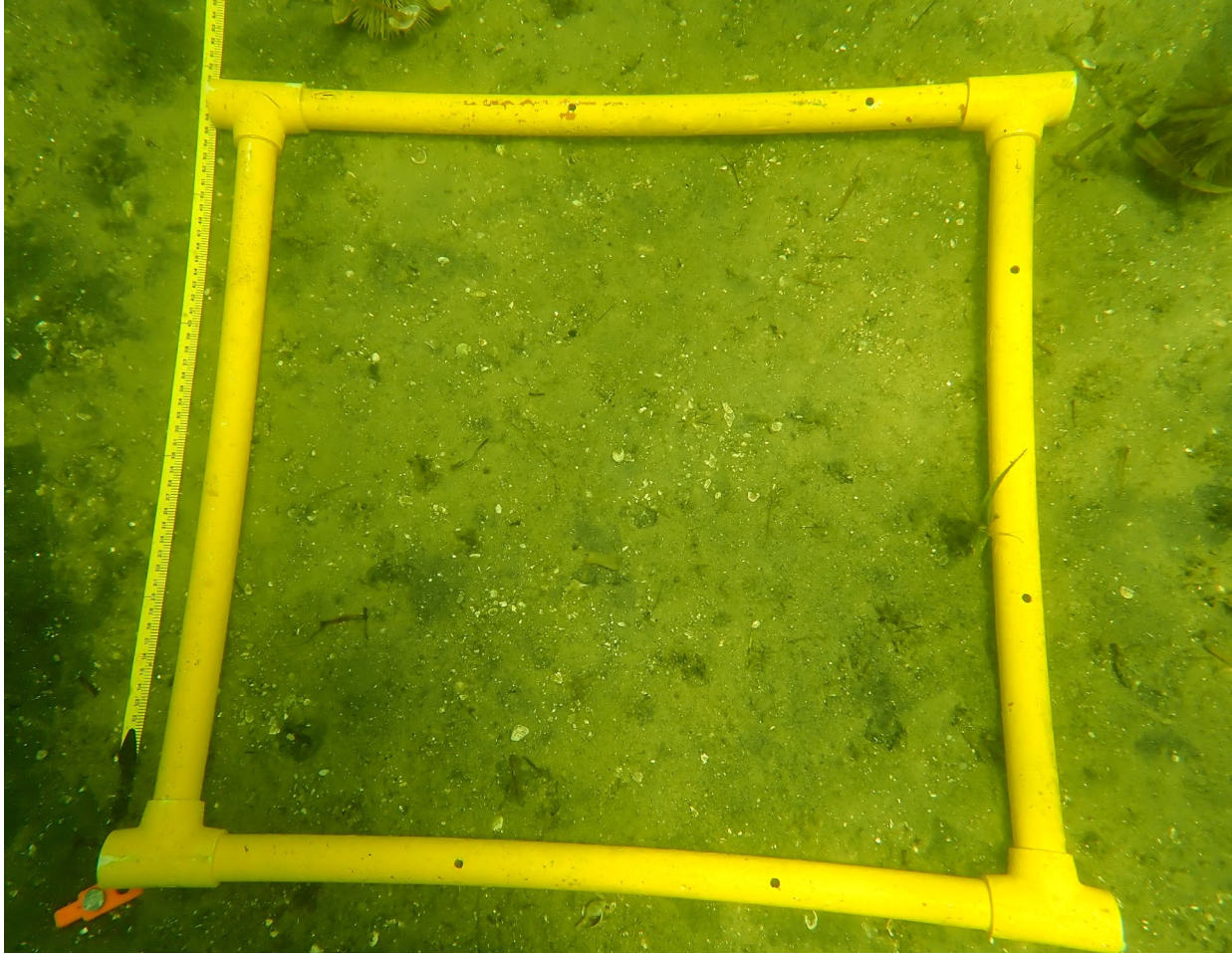
Temp	DO (mg/L)	Salinity	pH
27.6	5.92	32.18	8.25

Urchin Survey Bare Quad

USB09

GPS:29.80656, -83.622

Date: 5/16/2023



Urchin Survey Bare Quad

USB09
GPS:29.80656, -83.622
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_OVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYT_DENSITY	SEDIMENT_TYPE	Rhizomes
5/16/2023	USB09	Bare	TTES	1	10			0	0	Grass	1	1	0	Clean	Sand Mud Shell	Yes

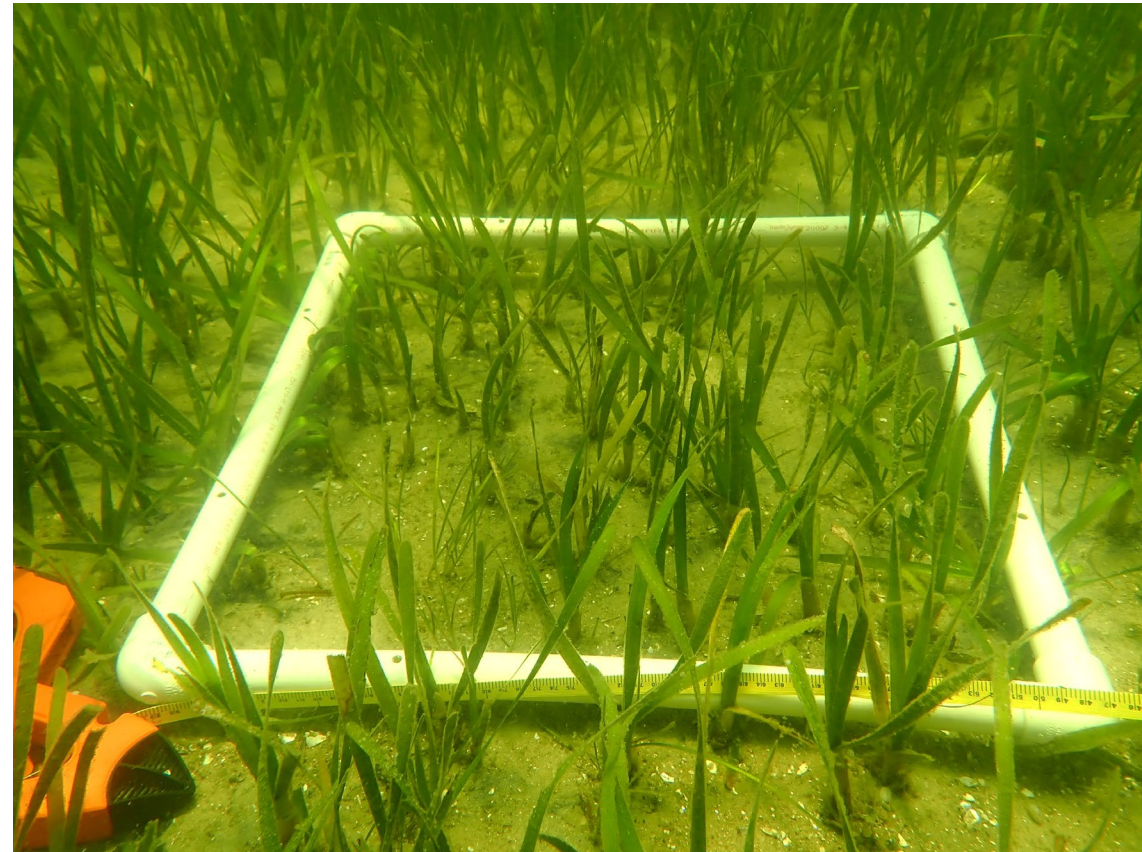
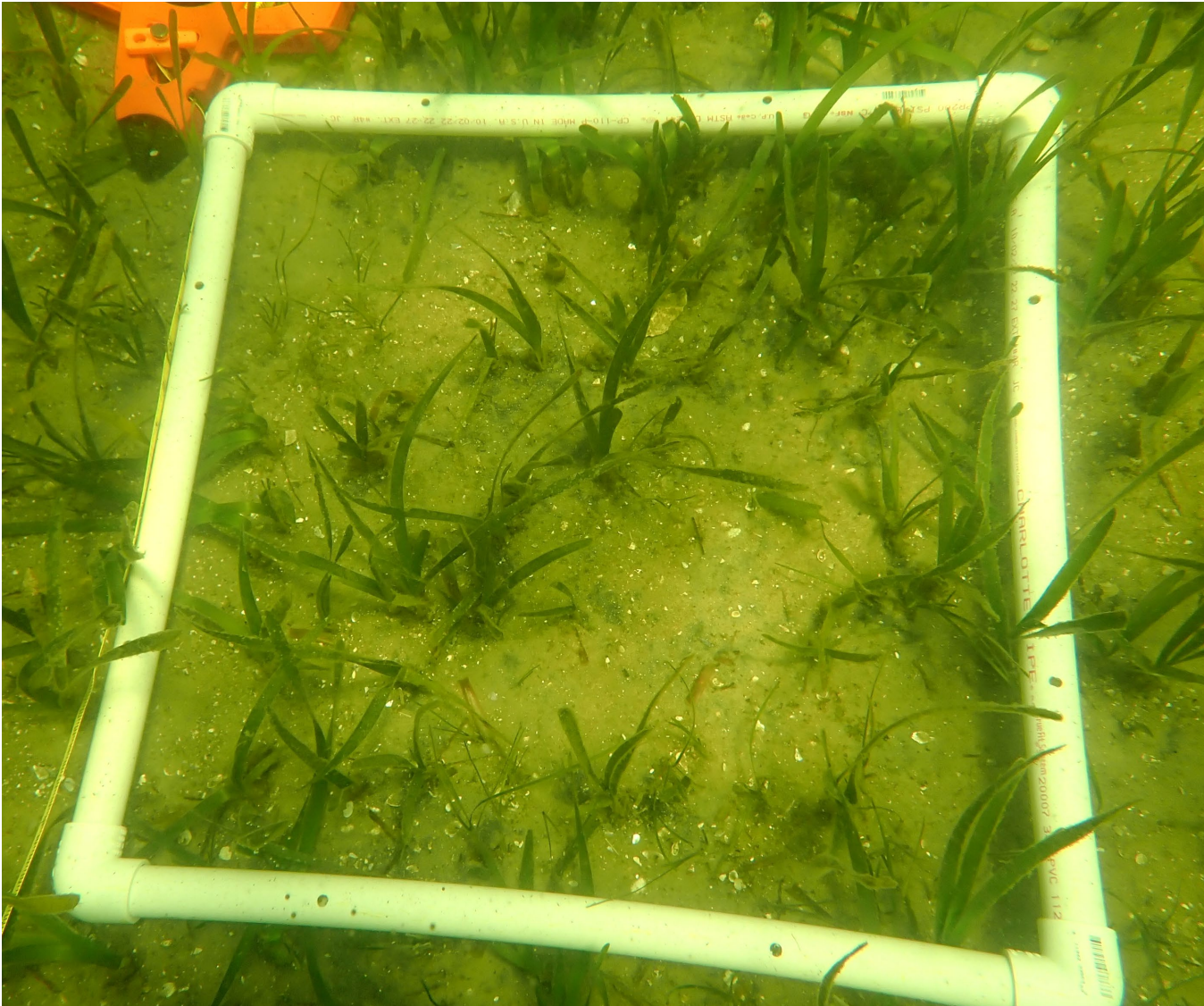
Temp	DO (mg/L/)	Salinity	pH
28	5.75	32.14	8.24

Urchin Survey Bare Quad

USB10

GPS:29.80826, -83.6243

Date: 5/16/2023



Urchin Survey Bare Quad

USB10
GPS:29.80826, -83.6243
Date: 5/16/2023

Data

Date	Site Name	Type	SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTETYPE	SEDIMENT_TYPE	Rhizomes
5/16/2023	USB10	Bare	TTES	20	19	20.5	24	0	0	Grass	26	26	0	Clean	Sand Mud Shell	Yes
5/16/2023	USB10	Bare	HWRI	5	12	6	12.5			Grass						
5/16/2023	USB10	Bare	SFIL	1	7	5	4			Grass						

Temp	DO (mg/L/)	Salinity	pH
28.3	6.58	28.3	8.27

Averages for All Sampling Events

Fig.1

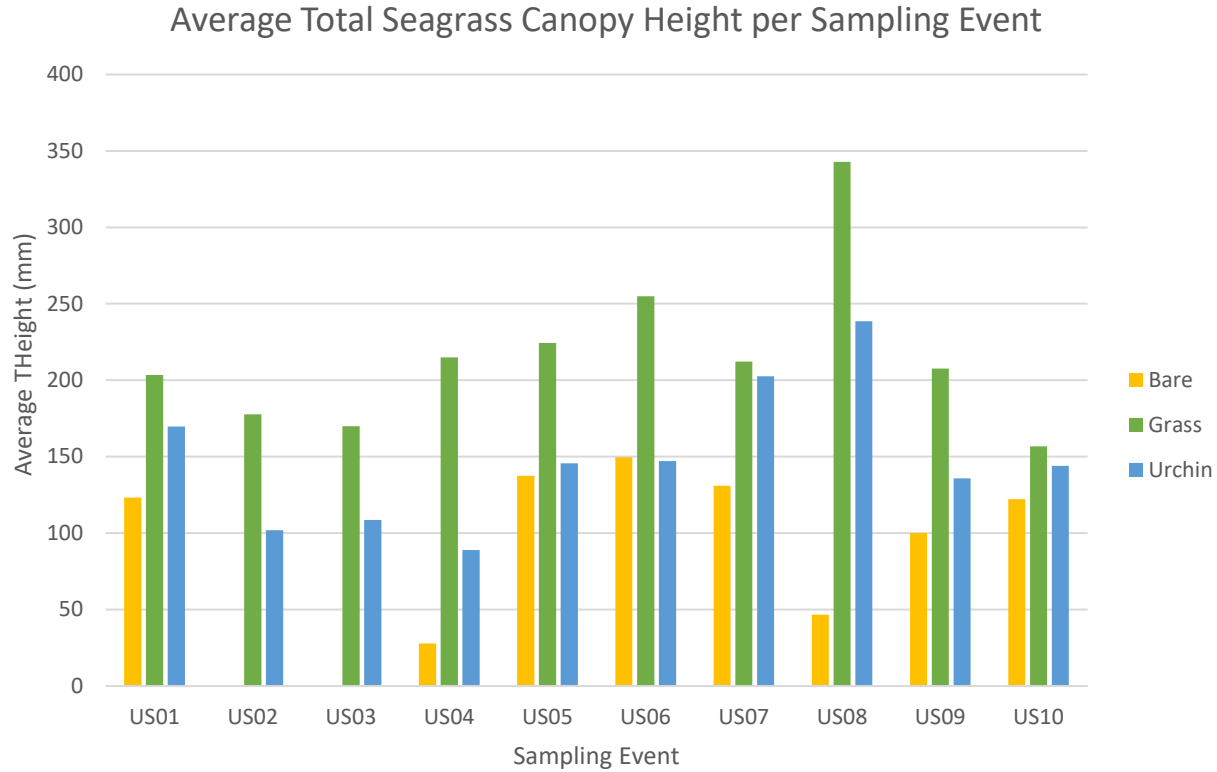


Figure 1. The average canopy height for all seagrass species within a quad.

Fig.2

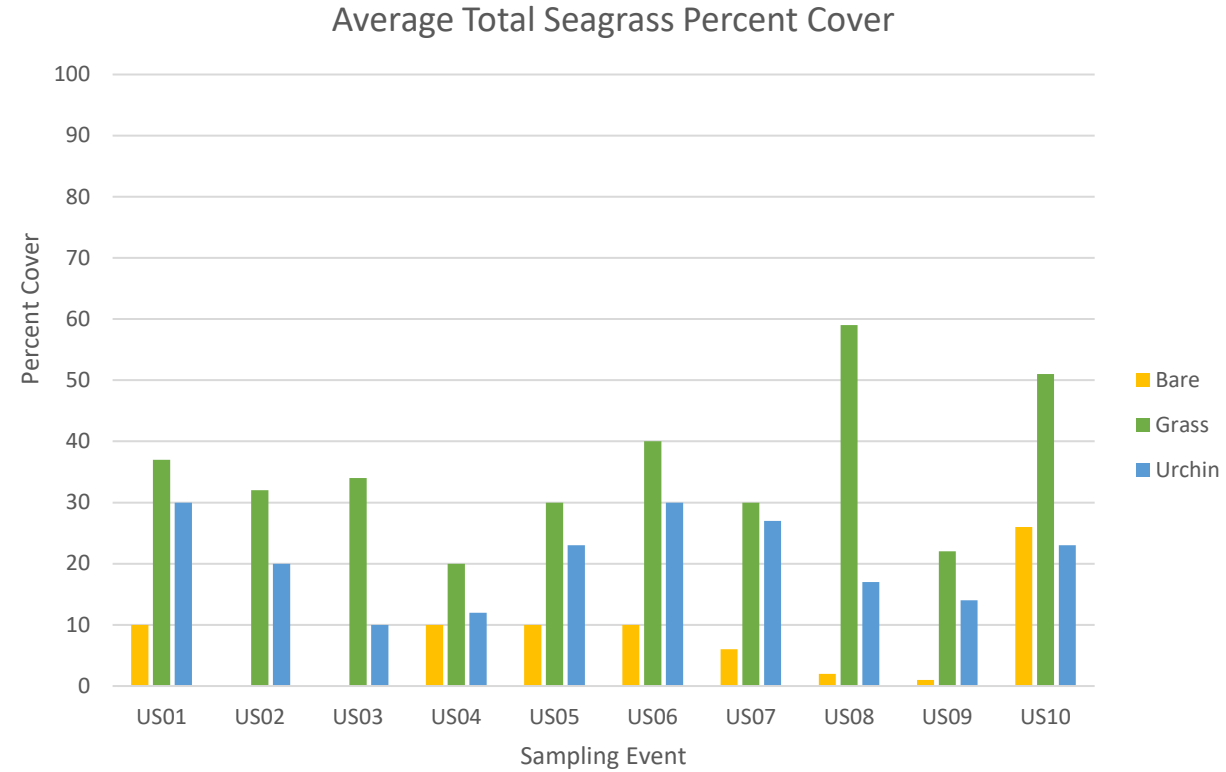


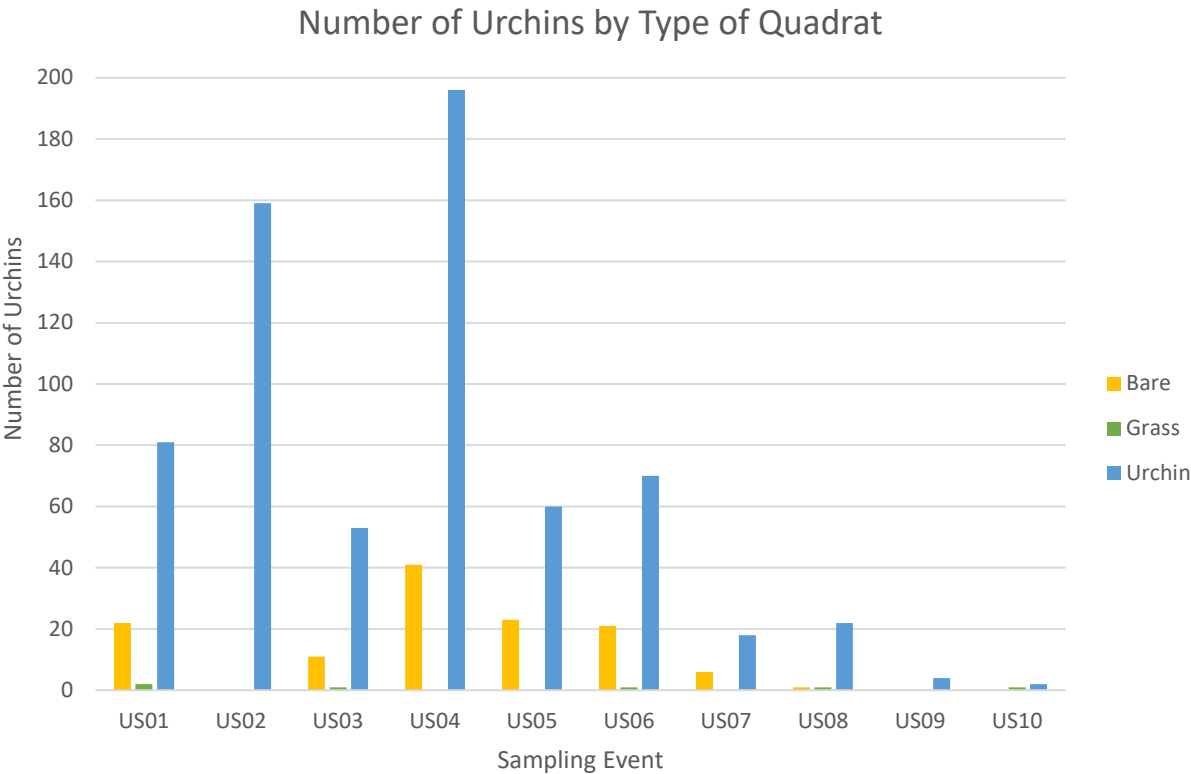
Figure 2. The total percent cover of all seagrass present in each quad.

Other Averages for All Sampling Events

Monthly density averages by type of quad

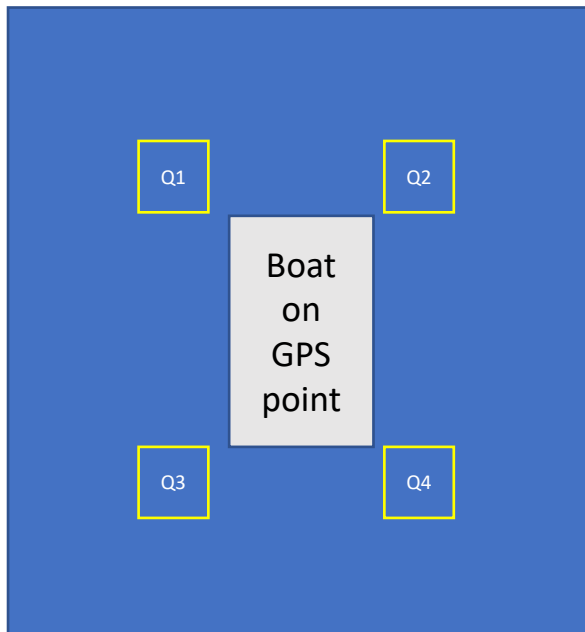
month	type	avg SAV %	avg grass %
February	Bare	3.333333	3.333333
February	Grass	34.66667	34.33333
February	Urchin	20	20
March	Bare	10	10
March	Grass	30	30
March	Urchin	21.66667	21.66667
April	Bare	6	6
April	Grass	30	30
April	Urchin	28	27
May	Bare	9.666667	9.666667
May	Grass	44.66667	44
May	Urchin	18.33333	18

Note the average Braun-Blanquet density between 2017-2022 was 4.54 at DBKB14 and 4.42 at DBKB15. The surveys were conducted between DBKB 14 and DBKB15. The surveys of DBKB14 and DBKB15 on 8 February 2023 show that DBKB BB density as 1.25 for DBKB14 where the urchins have passed through already and 3.5 at DBKB15 where the urchins are headed. DBKB14 had a BB density of 3.5 and average total SAV % of 47.5% in 2022. DBKB15 had a BB density of 3.75 and total SAV % of 58% in 2022.



The following slides use a 1m² quadrat to reflect seagrass monitoring protocols followed by BBSAP. The following sites, DBKB14 and DBKB15, are established seagrass sites monitored yearly by BBSAP. SOP can be found on [SEACAR](#) under BBSAP Protocols. These sites were used to compare to historical seagrass monitoring data. Sites 14 and 15 are on either side of the seagrass front line, urchins have passed 14 and are heading in the direction of 15 currently.

Sample Design



Four quadrats thrown randomly around boat which sits atop the site GPS point.



Urchin Survey DBKB14 Quad 1

DBKB14 GPS:

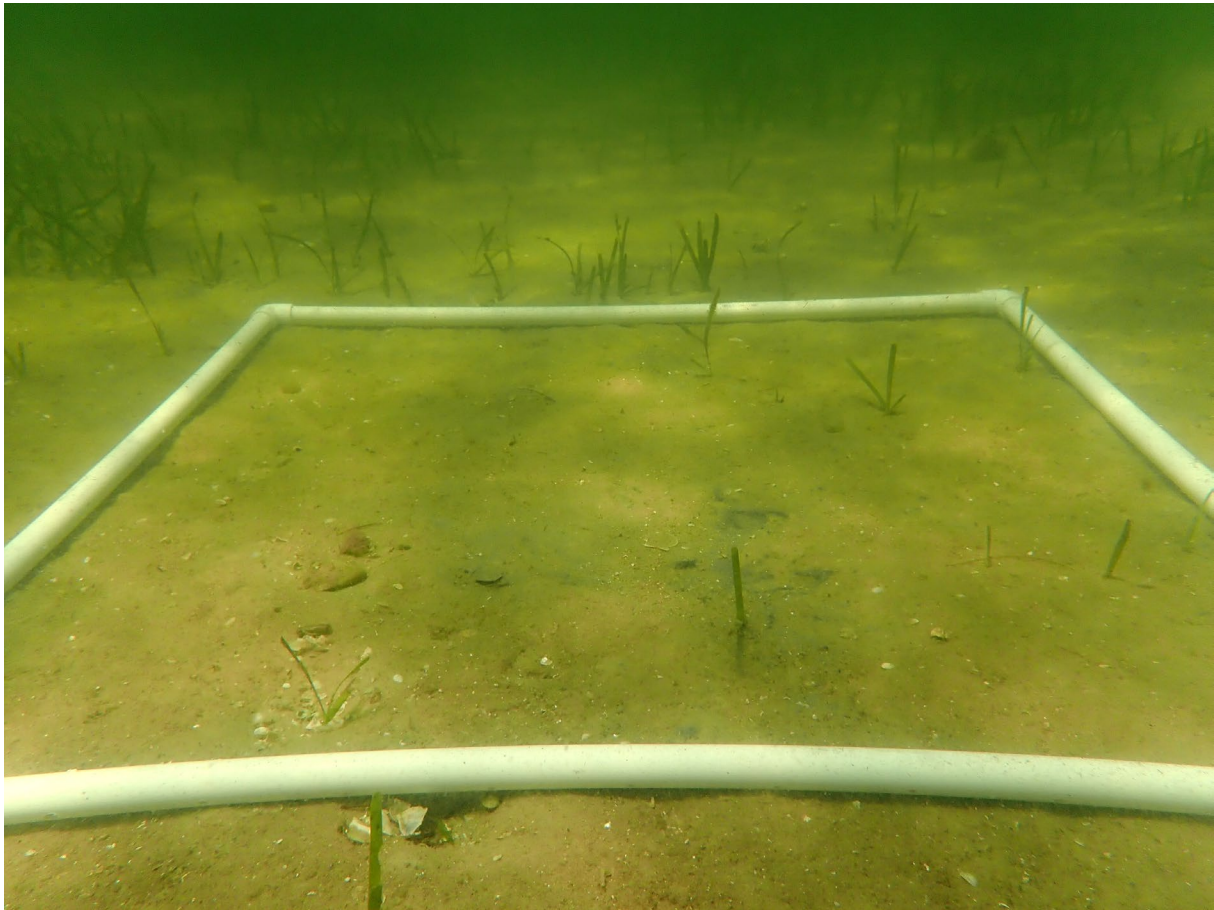
Latitude

29.8067

Longitude

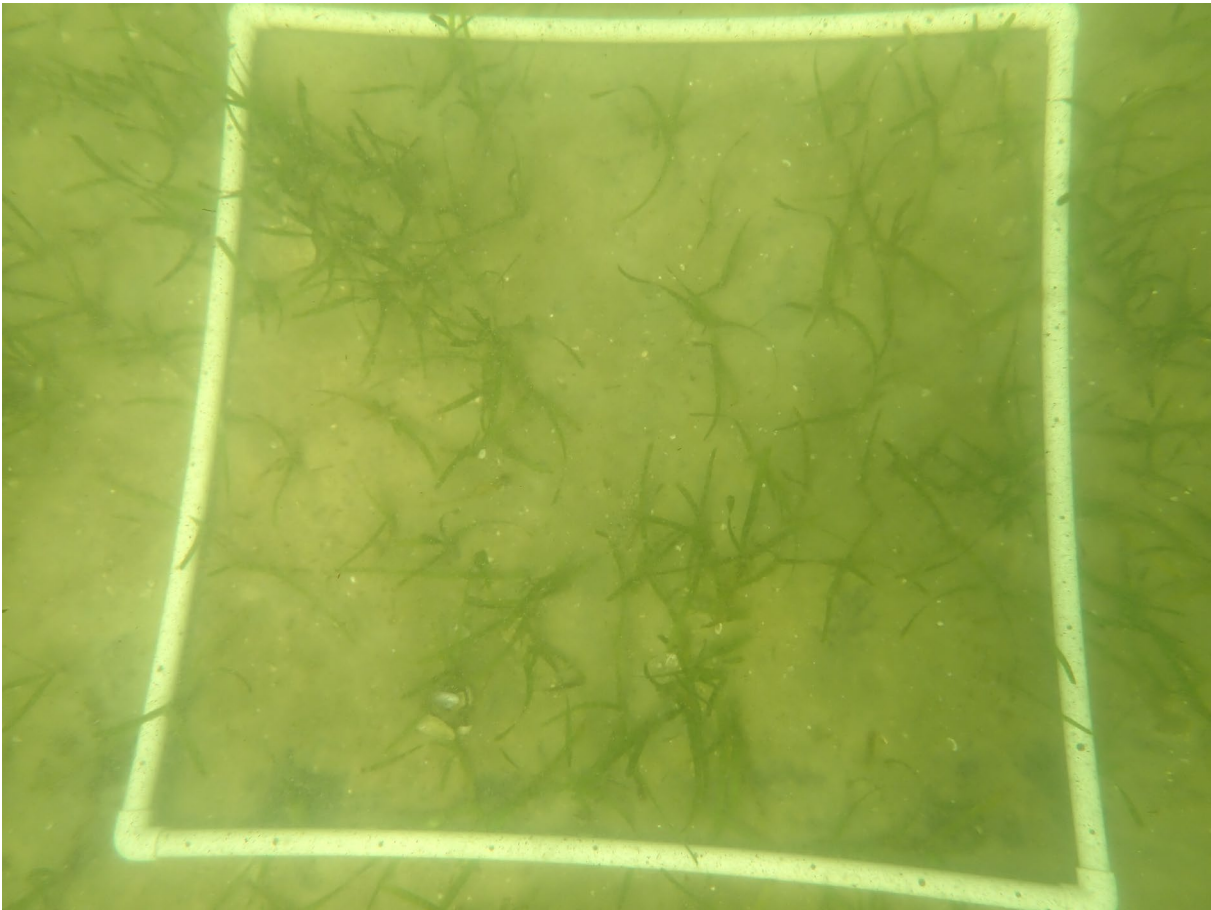
-83.6311

April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	2	1	120	150	80	0	0

May 17, 2023

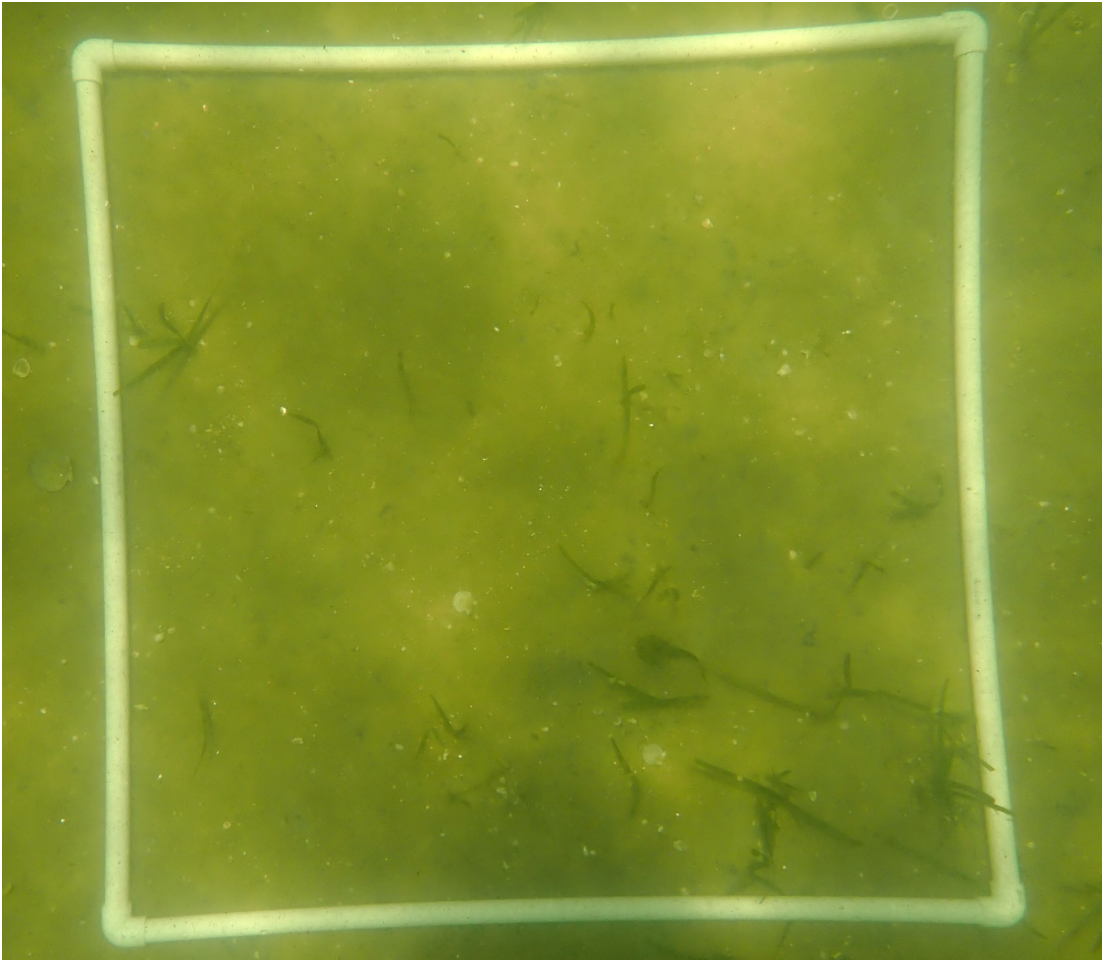


SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	15	2	240	240	180	1	0

Urchin Survey DBKB14 Quad 2

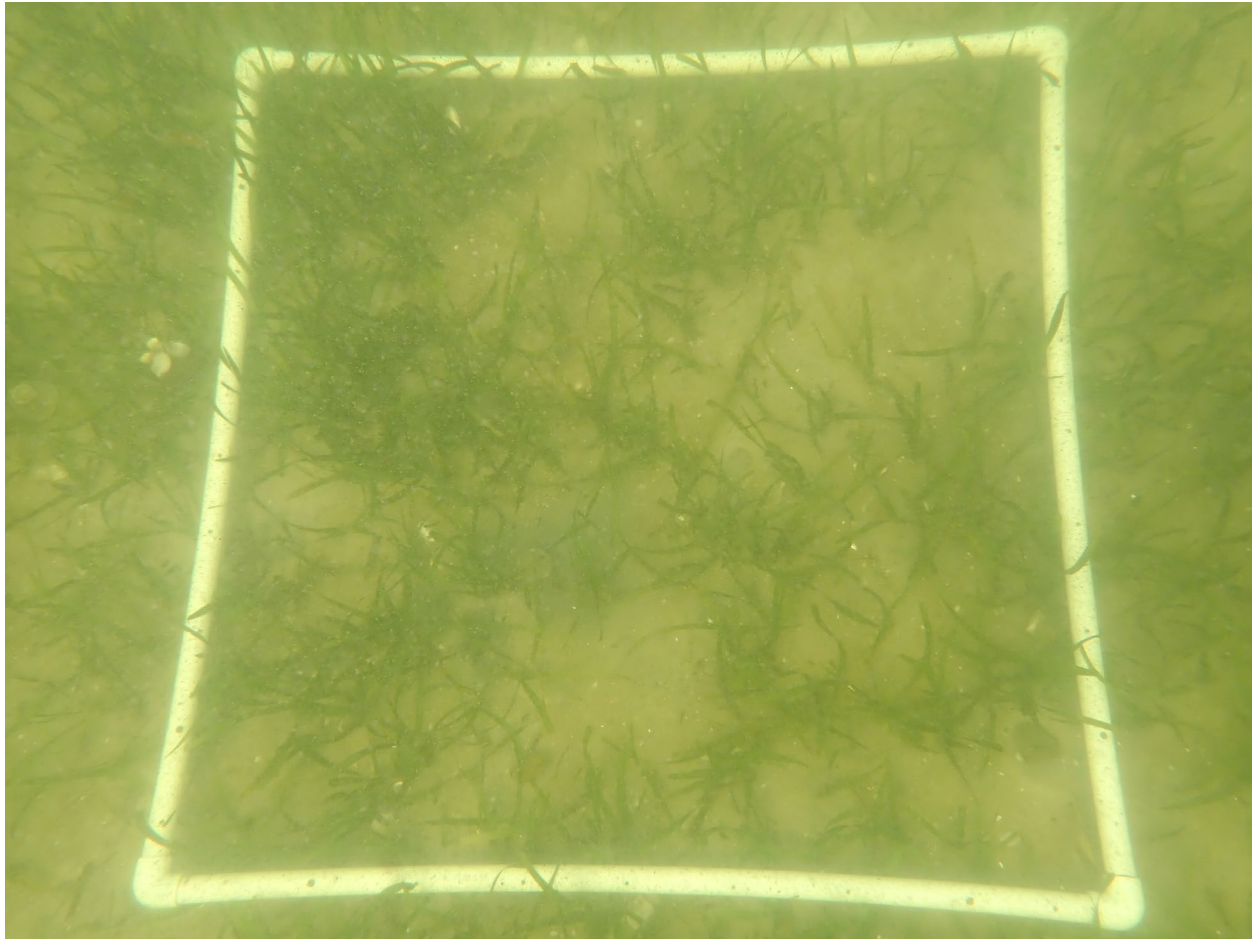
DBKB14 GPS: Latitude 29.8067
Longitude -83.6311

April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	5	1	150	65	125	0	0

May 17, 2023

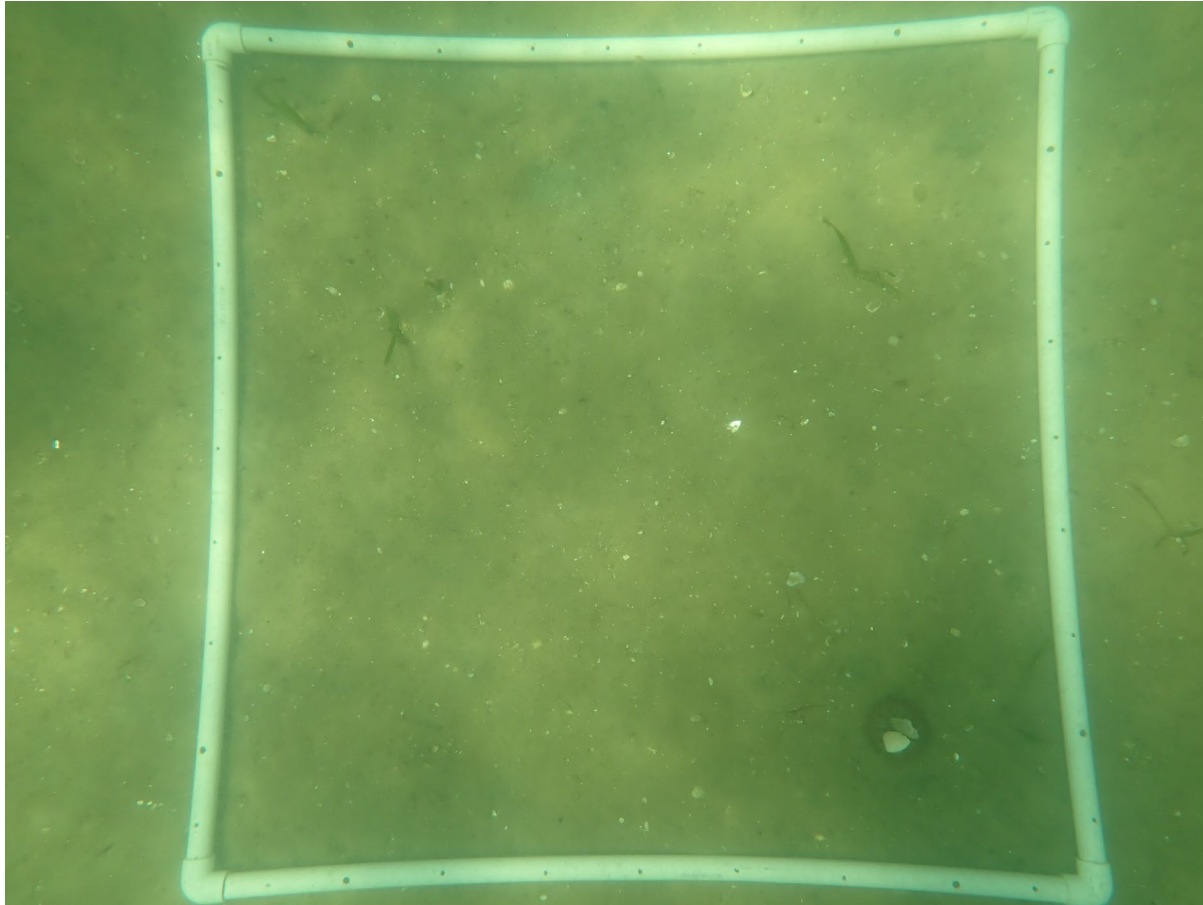


SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	30	3	240	180	220	1	2

Urchin Survey DBKB14 Quad 3

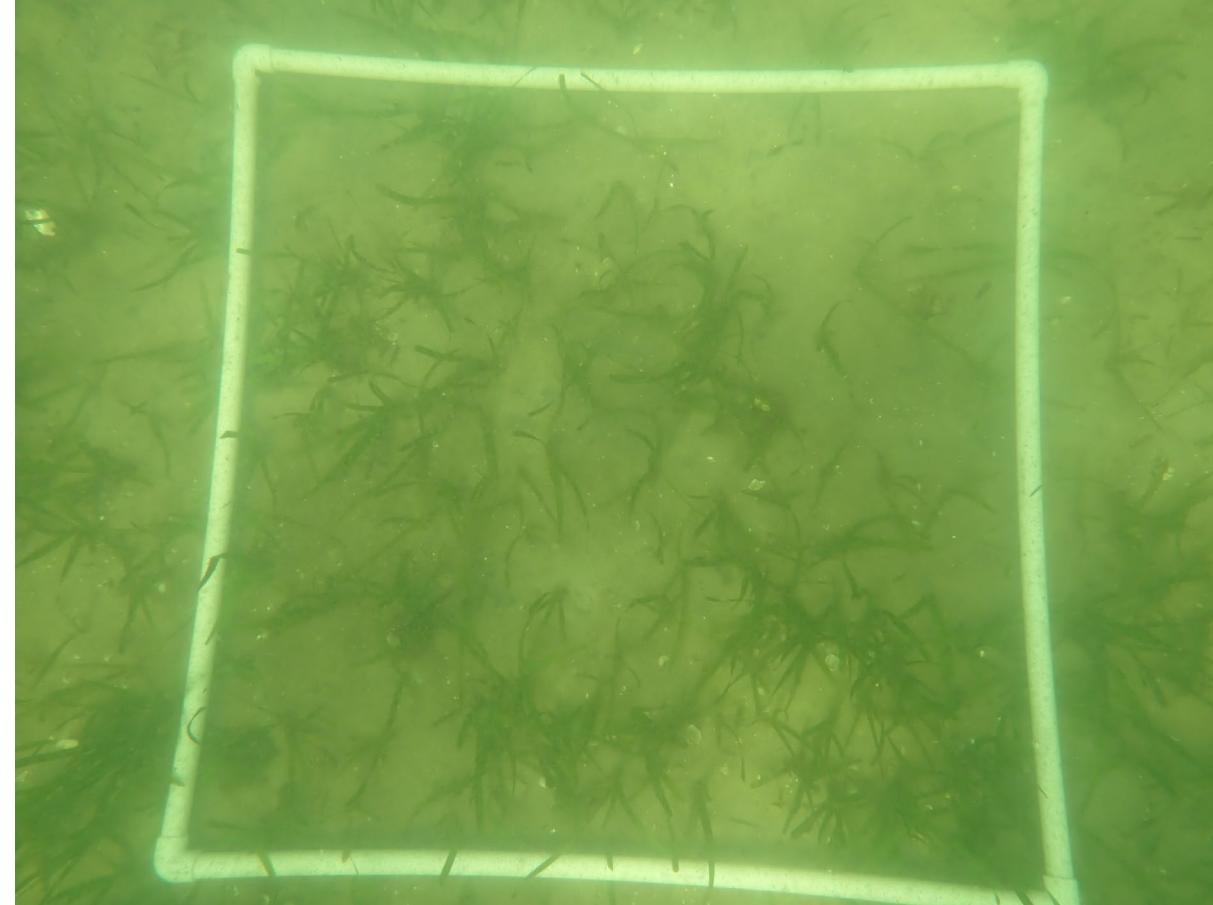
DBKB14 GPS: Latitude 29.8067
Longitude -83.6311

April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	3	1	111	72	75	1	0

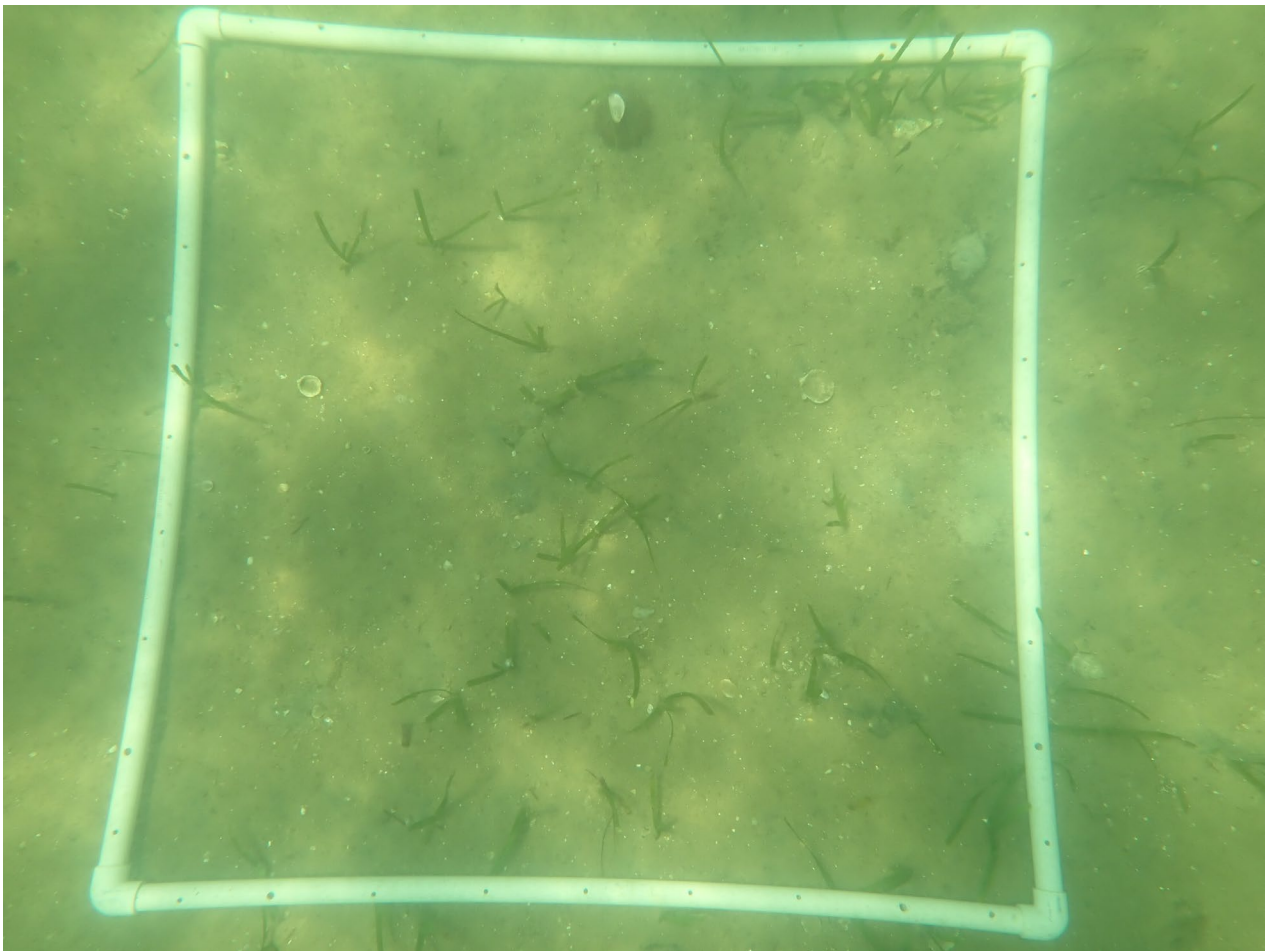
May 17, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	18	2	145	155	157	3	0

Urchin Survey DBKB14 Quad 4

April 20, 2023

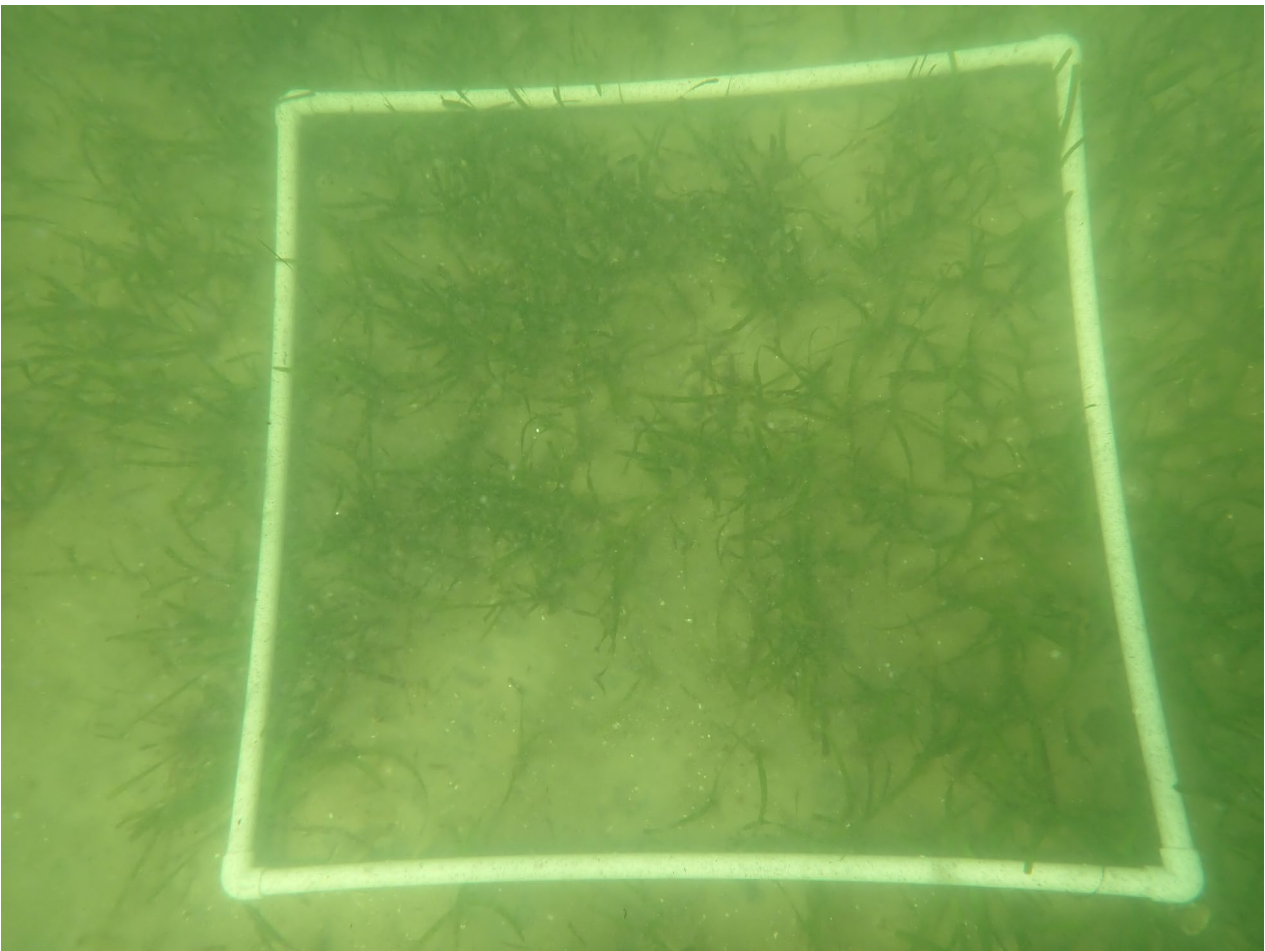


SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	7	2	130	55	152	1	0

DBKB14 GPS:

Latitude 29.8067
Longitude -83.6311

May 17, 2023

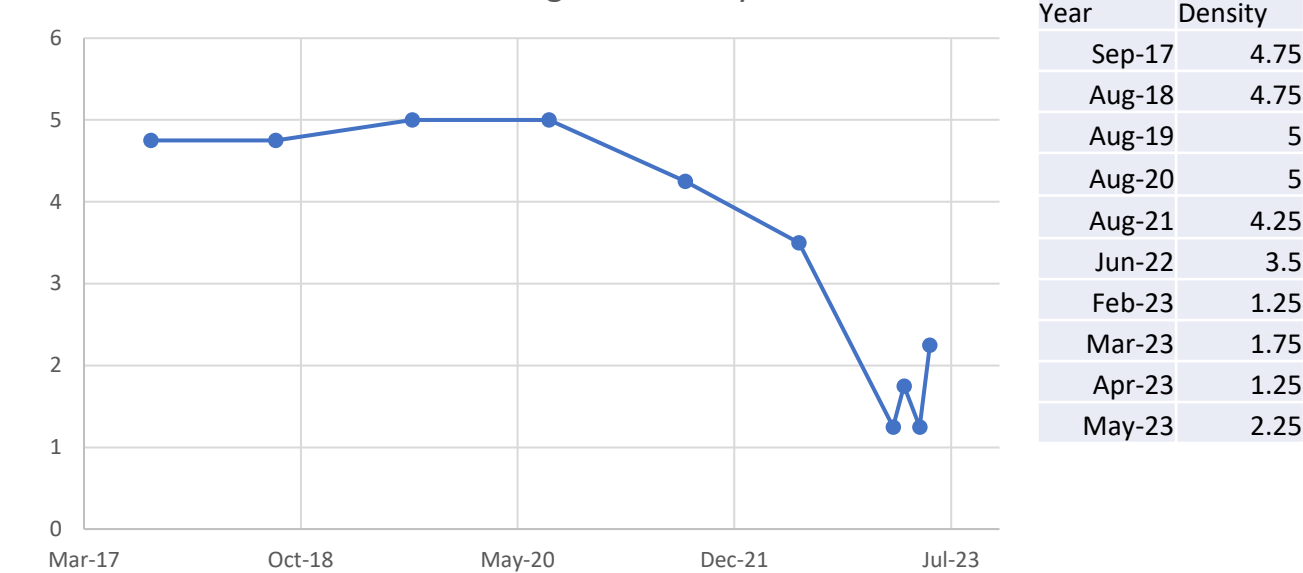


SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	25	2	200	180	200	0	2

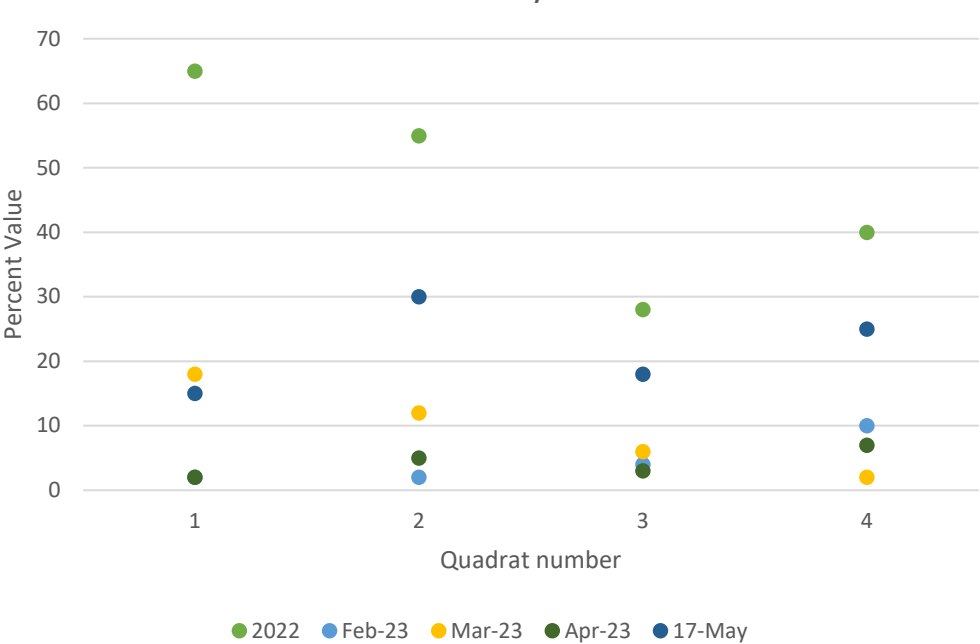
Urchin Survey DBKB14 Visit

DBKB14 GPS: Latitude 29.8067
 Longitude -83.6311

DBKB14 Average BB Density



DBKB14 Percent Cover by Quad 2022-2023



Braun-Blanquet Score	2017	2018	2019	2020	2021	2022	Feb-23	Mar-23	4/20/2023	23-May
Quad 1	5	5	5	5	4	4	1	2	1	2
Quad 2	5	5	5	5	5	4	1	2	1	3
Quad 3	4	4	5	5	4	3	1	2	1	2
Quad 4	5	5	5	5	4	3	2	1	2	2

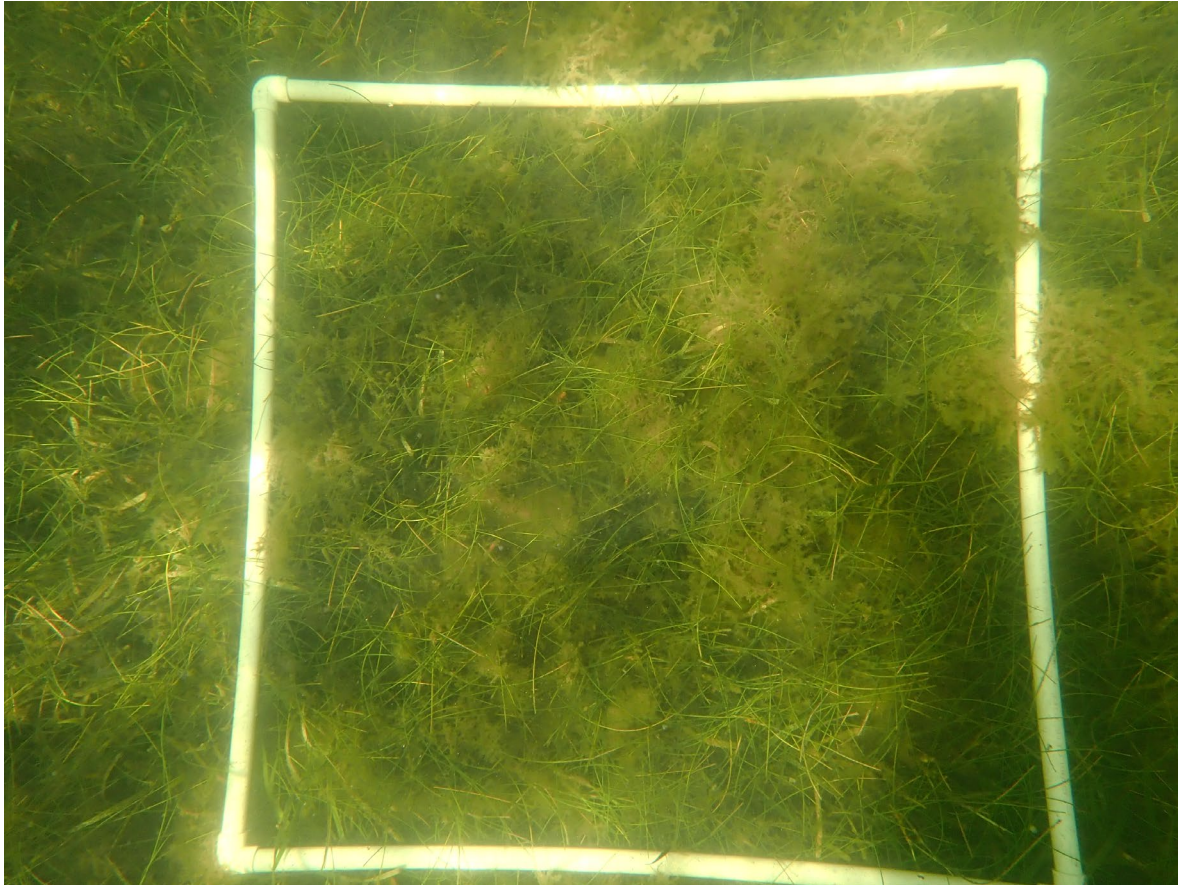
Percent Cover by QuadYear	2022	Feb-23	Mar-23	4/23/2023	17-May
Quad 1	65	2	18	2	15
Quad 2	55	2	12	5	30
Quad 3	28	4	6	3	18
Quad 4	40	10	2	7	25

Note that only species of seagrass found in DBKB14 has been *T. testudium*, except once in 2022 when *H. engelmannii* was found in one replicate at 2%

Also note that GPS accuracy is to 9 meters and the quads are tossed at random around the coordinate so the quads will not land in the exact spot each time.

Urchin Survey DBKB15 Quad 1

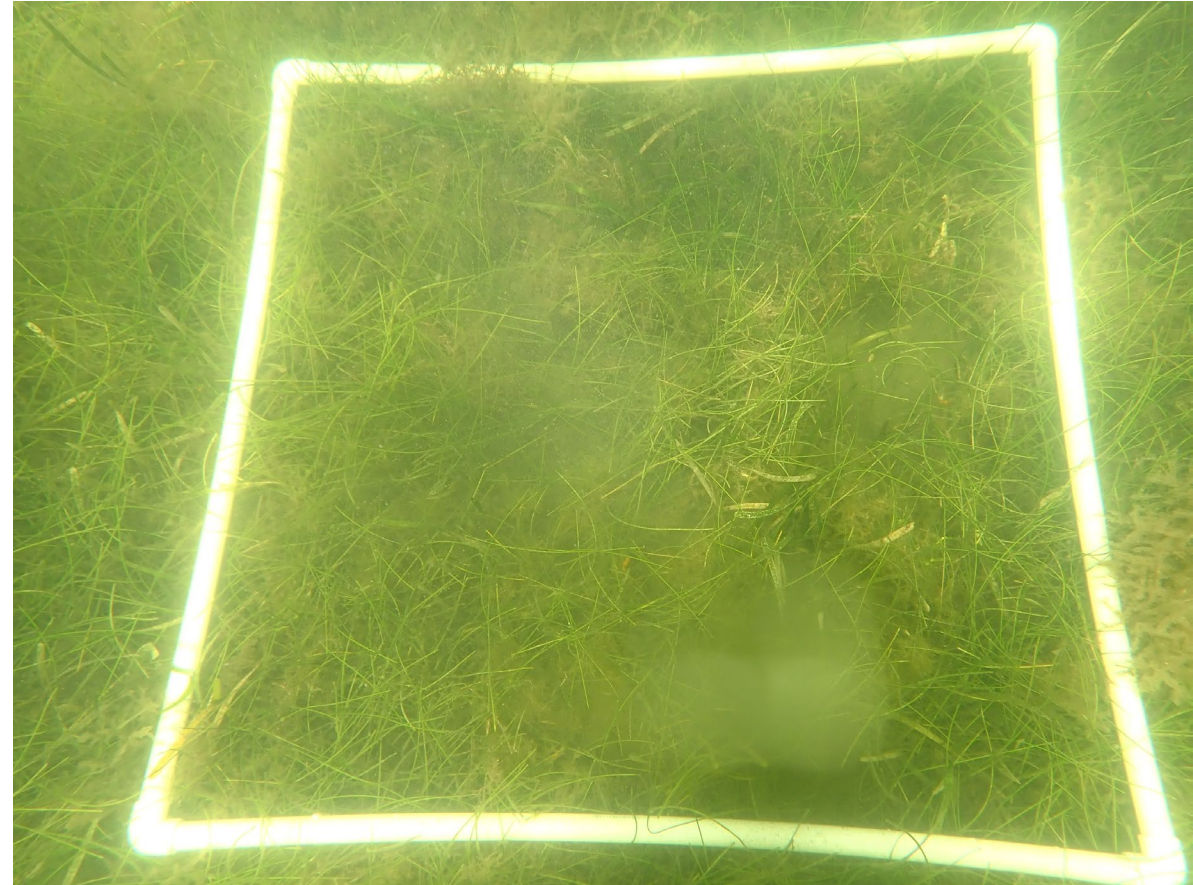
April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
SFIL	70	4	303	309	318	0	0
TTES	5	1	284	285	399		

DBKB15 GPS: Latitude 29.8015
Longitude -83.6171

May 17, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	5	1	370	355	346	0	0
SFIL	55	4	350	380	370		

Urchin Survey DBKB15 Quad 2

April 20, 2023



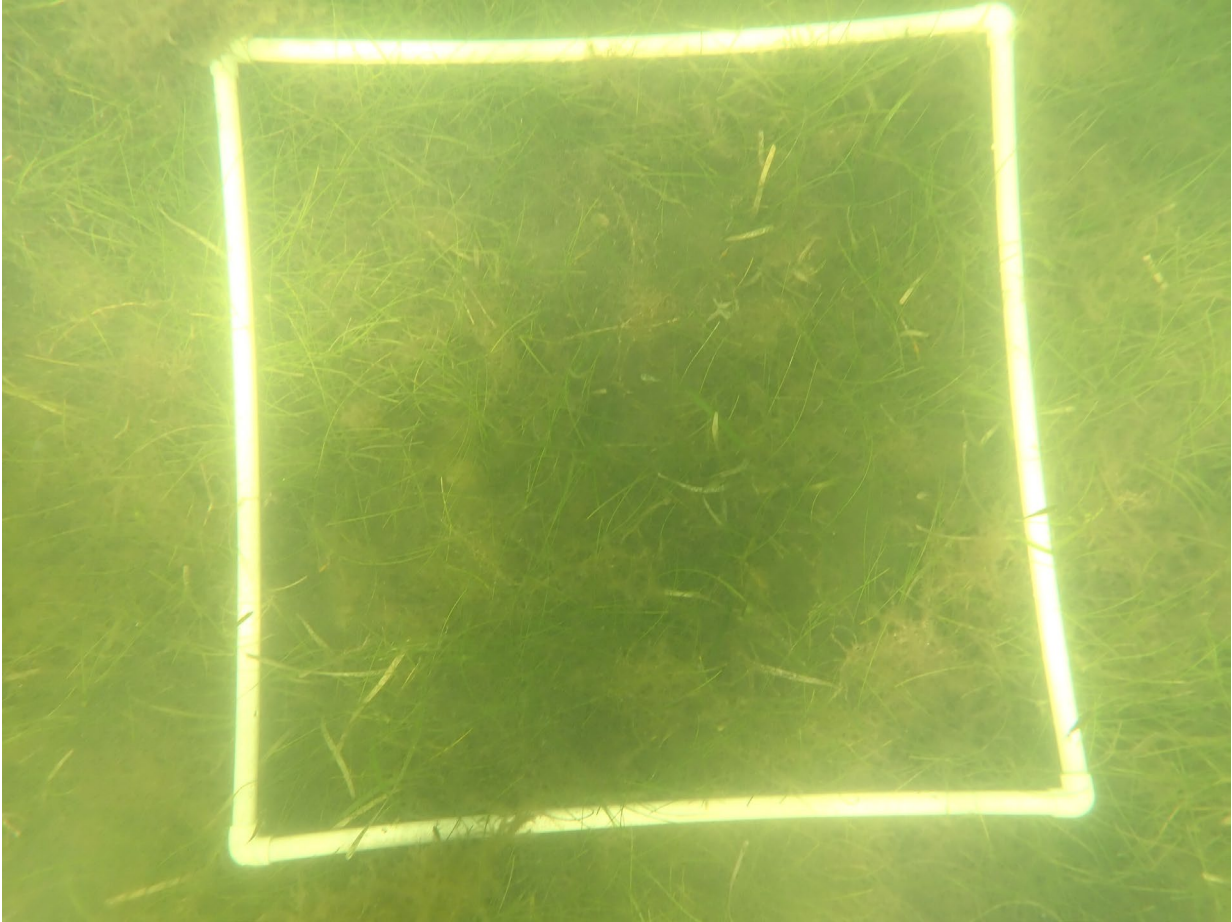
SPECIES	PERCENT_COVER	BB_COVER	Canopy_HT (mm)	Canopy_HT (mm)	Canopy_HT (mm)	URCHINS	SCALLOPS
SFIL	50	3	333	375	375	0	0
TTES	10	2	331	314	304		
HINC	1	1					

DBKB15 GPS:

Latitude 29.8015

Longitude -83.6171

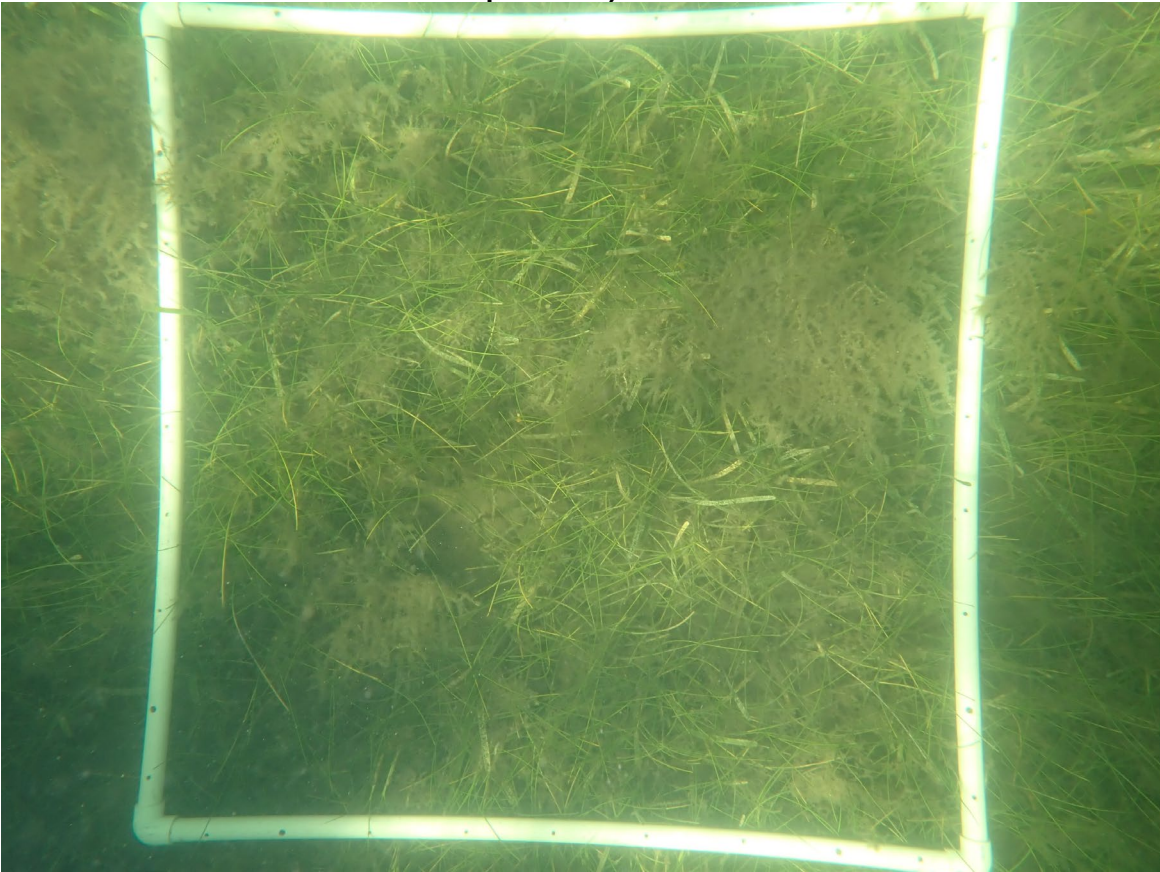
May 17, 2023



SPECIES	PERCENT_COVER	BB_COVER	Canopy_HT (mm)	Canopy_HT (mm)	Canopy_HT (mm)	URCHINS	SCALLOPS
TTES	3	1	350	570	410	0	0
SFIL	50	3	335	330	400		
HWRI	1	1	345				

Urchin Survey DBKB15 Quad 3

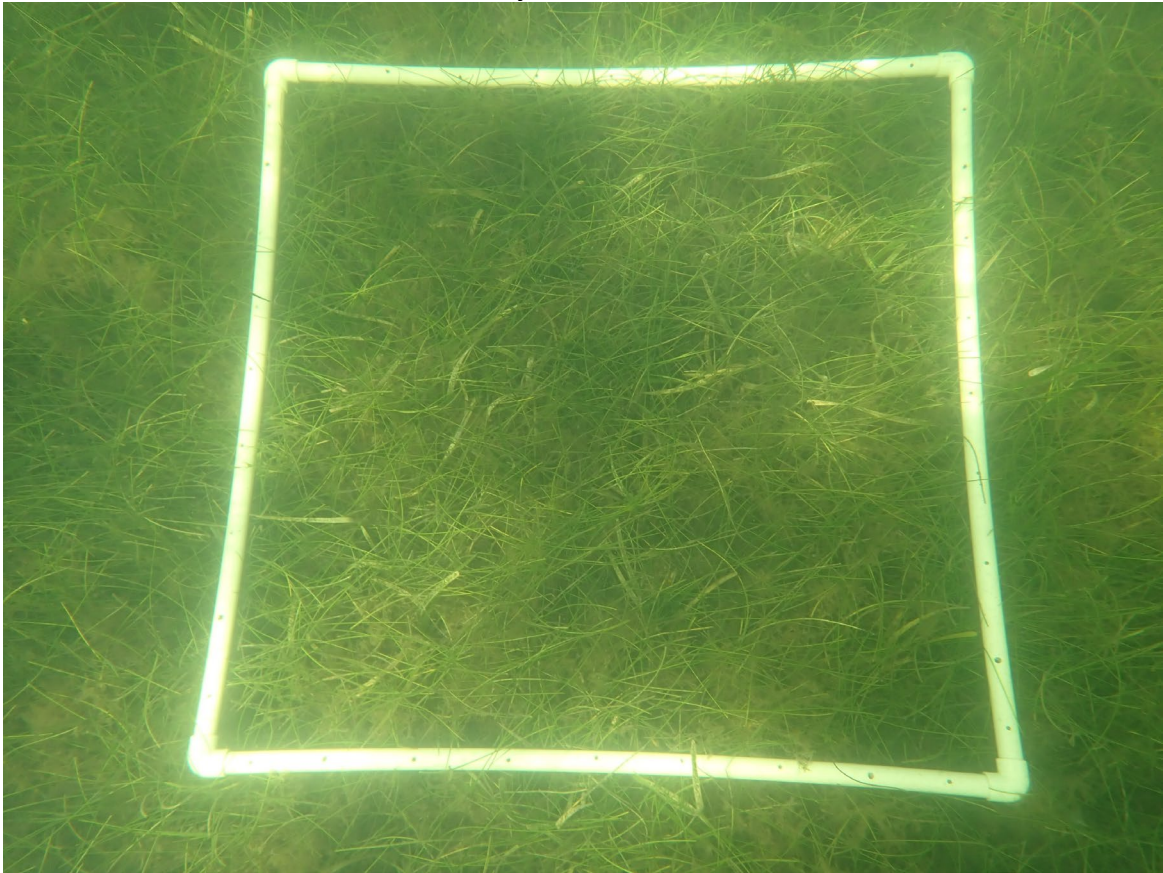
April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_ HT (mm)	Canopy_ HT (mm)	Canopy_ HT (mm)	URCHINS	SCALLOPS
TTES	15	2	365	340	328	0	0
SFIL	40	3	400	280	370		

DBKB15 GPS: Latitude 29.8015
 Longitude -83.6171

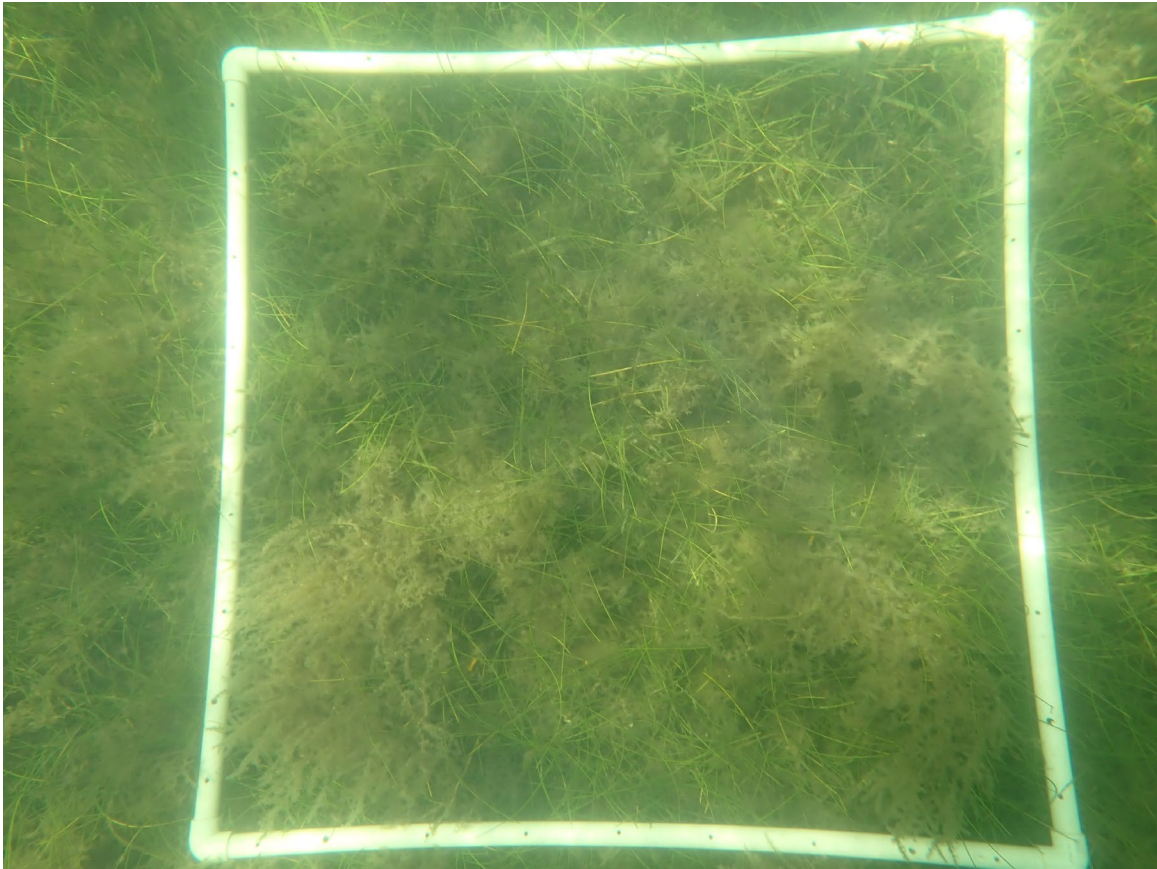
May 17, 2023



SPECIES	PERCENT COVER	BB_COVE RAGE	Canopy_ T (mm)	Canopy_ T (mm)	Canopy_ T (mm)	URCHINS	SCALLOPS
TTES	8	2	309	325	350	0	0
SFIL	50	3	327	430	352		
HINC	3	1					
HENG	5	1	60	105	107		

Urchin Survey DBKB15 Quad 4

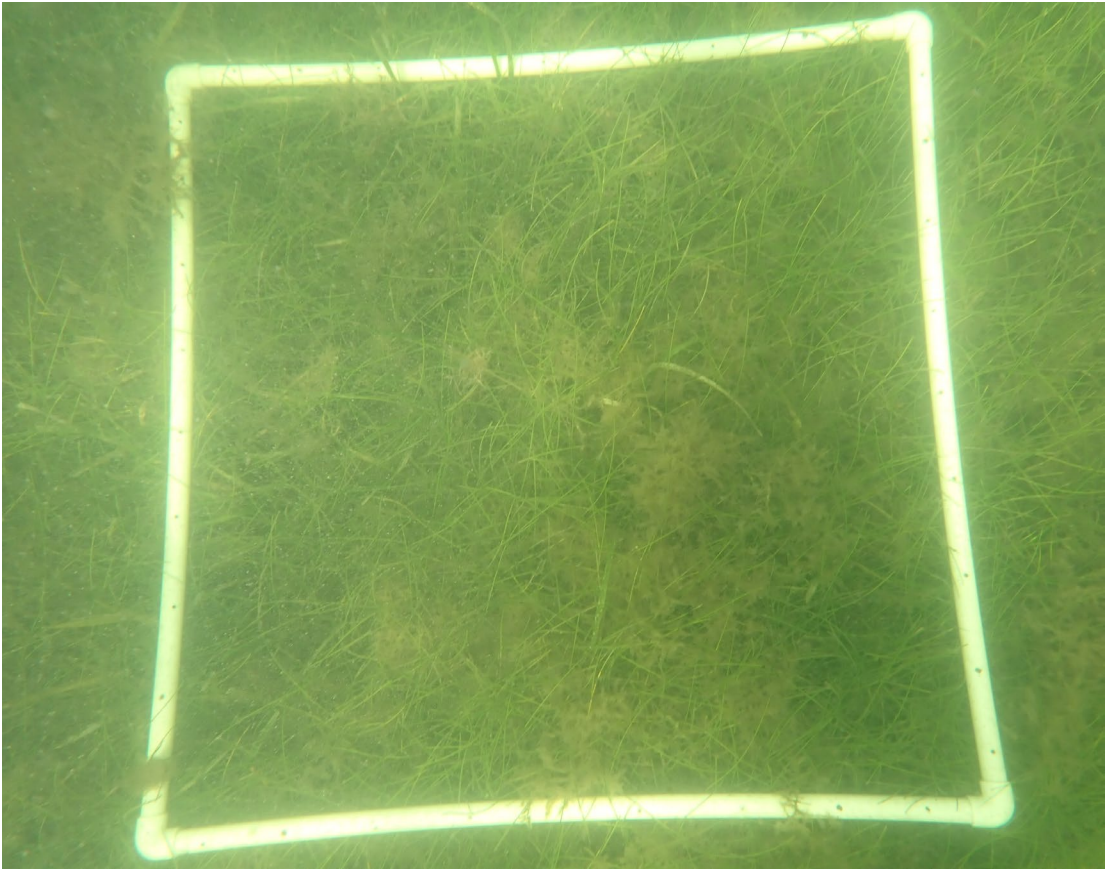
April 20, 2023



SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_H T (mm)	Canopy_H T (mm)	Canopy_H T (mm)	URCHINS	SCALLOPS
SFIL	40	3	275	360	380	0	0
TTES	5	1	280	410	270		

DBKB15 GPS: Latitude 29.8015
Longitude -83.6171

May 17, 2023

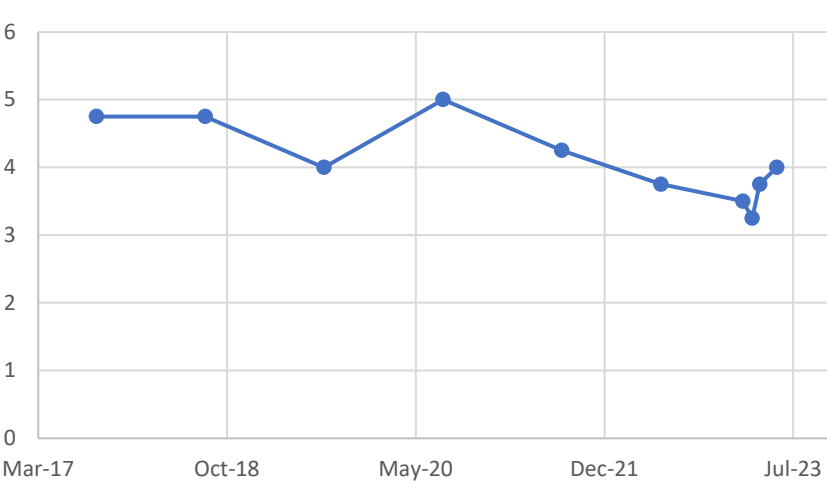


SPECIES	PERCENT _COVER	BB_COVE RAGE	Canopy_H T (mm)	Canopy_H T (mm)	Canopy_H T (mm)	URCHINS	SCALLOPS
TTES	3	1	447	526	453	0	0
SFIL	50	3	465	440	500		
HWRI	3	1	293	195	270		

Urchin Survey DBKB15 Visit

DBKB15 GPS: Latitude 29.8015
Longitude -83.6171

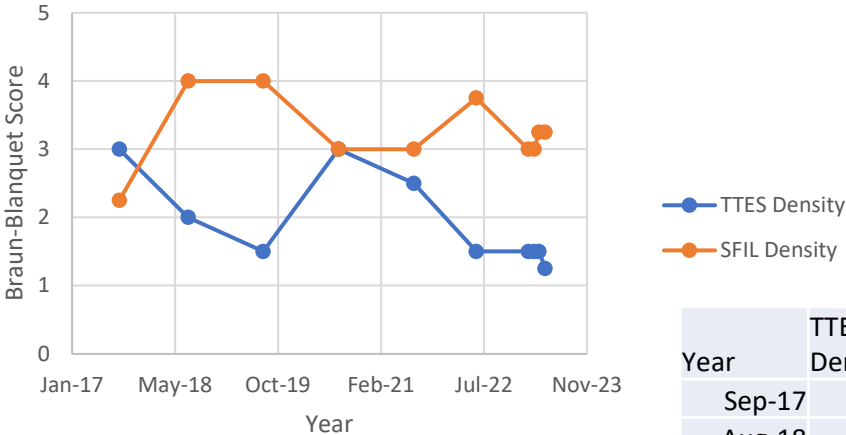
DBKB15 Total Seagrass Density



Year	BB Density
Sep-17	4.75
Aug-18	4.75
Aug-19	4
Aug-20	5
Aug-21	4.25
Jun-22	3.75
Feb-23	3.5
Mar-23	3.25
Apr-23	3.75
23-May	4

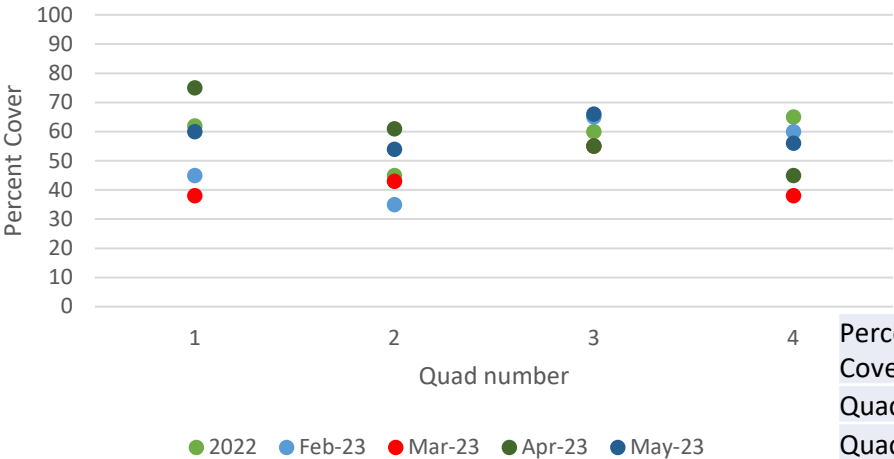
Braun-Blanquet Scores	2017	2018	2019	2020	2021	2022	Feb-23	Mar-23	Apr-23	23-May
Quad 1	5	4	4	5	5	4	3	3	4	4
Quad 2	5	5	2	5	4	3	3	3	4	4
Quad 3	5	5	5	5	5	4	4	4	4	4
Quad 4	4	5	5	5	3	4	4	3	3	4

DBKB15 TTES and SFIL Density



Year	TTES Density	SFIL Density
Sep-17	3	2.25
Aug-18	2	4
Aug-19	1.5	4
Aug-20	3	3
Aug-21	2.5	3
Jun-22	1.5	3.75
Feb-23	1.5	3
Mar-23	1.5	3
Apr-23	1.5	3.25
May-23	1.25	3.25

DBKB15 Percent Cover by Quad 2022-2023



Percent Cover	2022	Feb-23	Mar-23	Apr-23	17-May
Quad 1	62	45	38	75	60
Quad 2	45	35	43	61	54
Quad 3	60	65	55	55	66
Quad 4	65	60	38	45	56

Established Transect for Shoot Counts

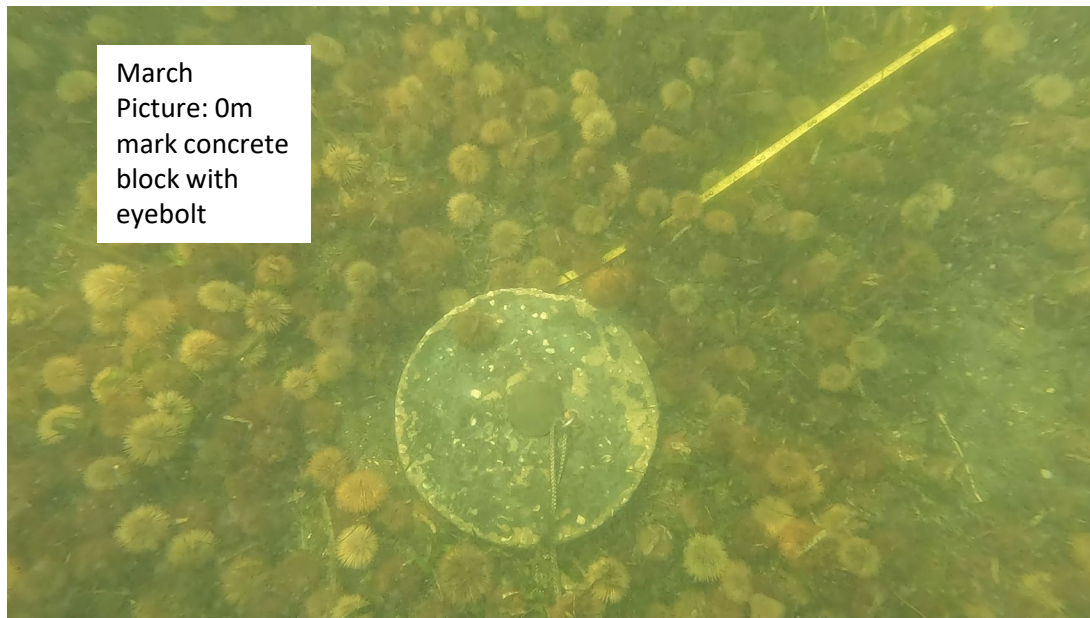
Addition of a 20m established transect starting in March. A cinderblock with and eyebolt was placed on the back edge of the urchin front and a transect of 20m was run from it toward the grazed area. At the 20m mark rebar was placed and flagged. GPS coordinates were taken at each end. Mini quadrats of 0.04 m^2 were placed every 2m starting at zero. Shoot heights of any living seagrass shoot were measured in millimeters using a ruler and recorded. The goal of this transect is to monitor any regrowth of seagrass following the grazing event. Pictures were taken at each quadrat and a video was taken of the entire line.

GPS:29.80332 -83.6267



NEW

A Temp/Light Sensor was placed at the 0m marker on 5/16/2023 at 10:30 am. We will hopefully have that data for the summer.



March Established Transect Data

Fig1 Shoot Counts per Quadrat along Transect 1 with Urchin counts

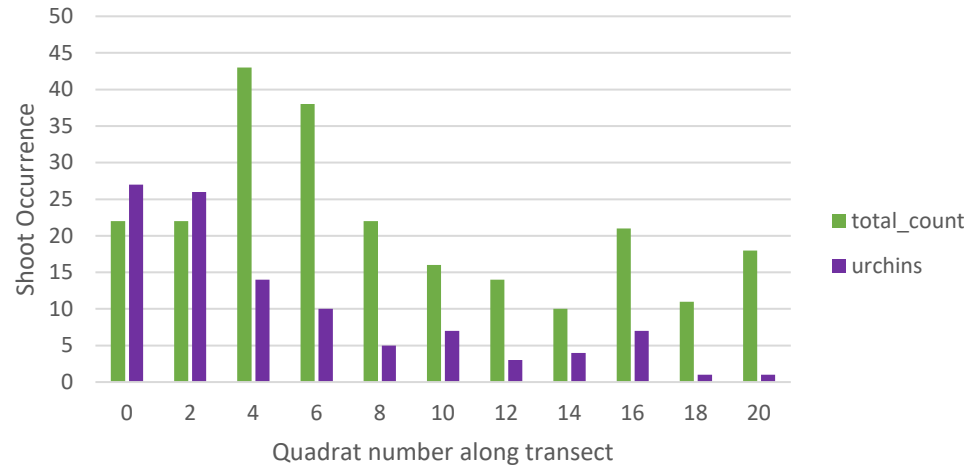


Fig2 Transect One Average Shoot Height and Urchin Count

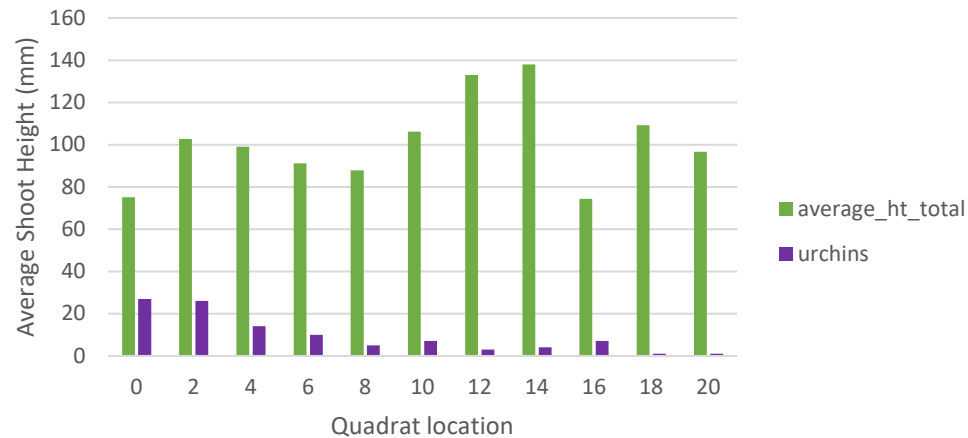


Fig3 Transect 1 Average Species Height

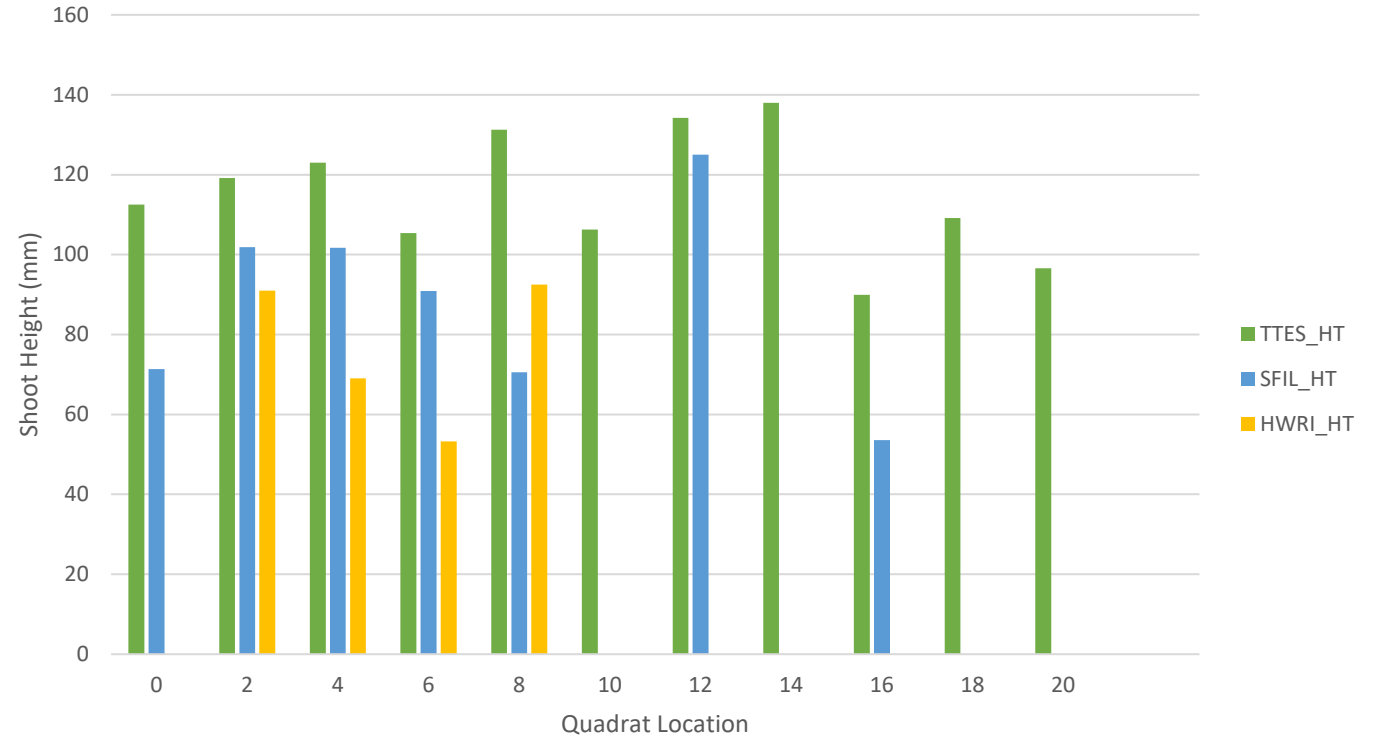


Figure 1. Number of individual shoots and number of urchins per quad. Figure 2. Average height in mm of all shoots in the quad and urchin count. Figure 3. Average height (mm) of each species shoot found in a quadrat, not all quads had all species present.

Ongoing Established Transect Data

Fig1

Monthly Transect Line Total Seagrass Occurrence

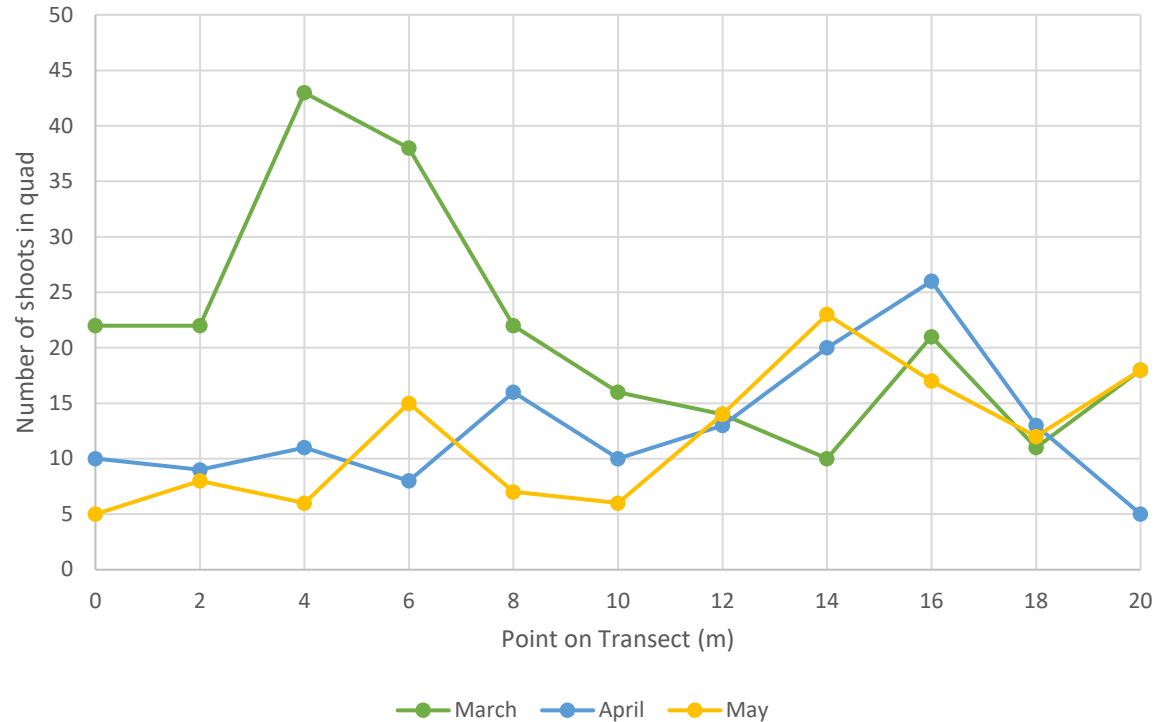


Figure 1. Total seagrass occurrence at each transect quadrat by month. Note that sites 0,2,and 4 had urchin line still on top of them in March, that line has since moved forward and/or dispersed.

Fig2

Monthly Transect Line Average Seagrass Shoot Height (mm)

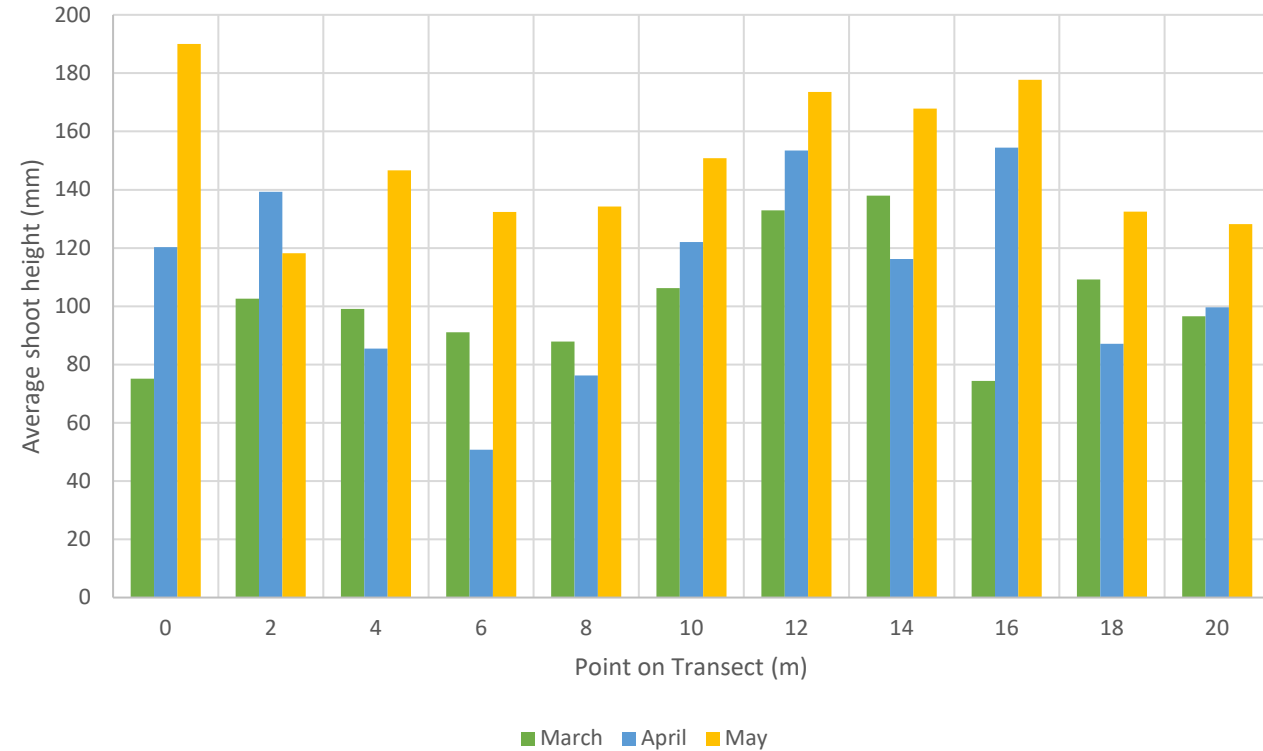


Figure 2. Average height in mm of all shoots in the quad by month. Note seagrass growing season begins in May.

Ongoing Established Transect Data

Fig1

Monthly Transect Line Total TTES Occurrence

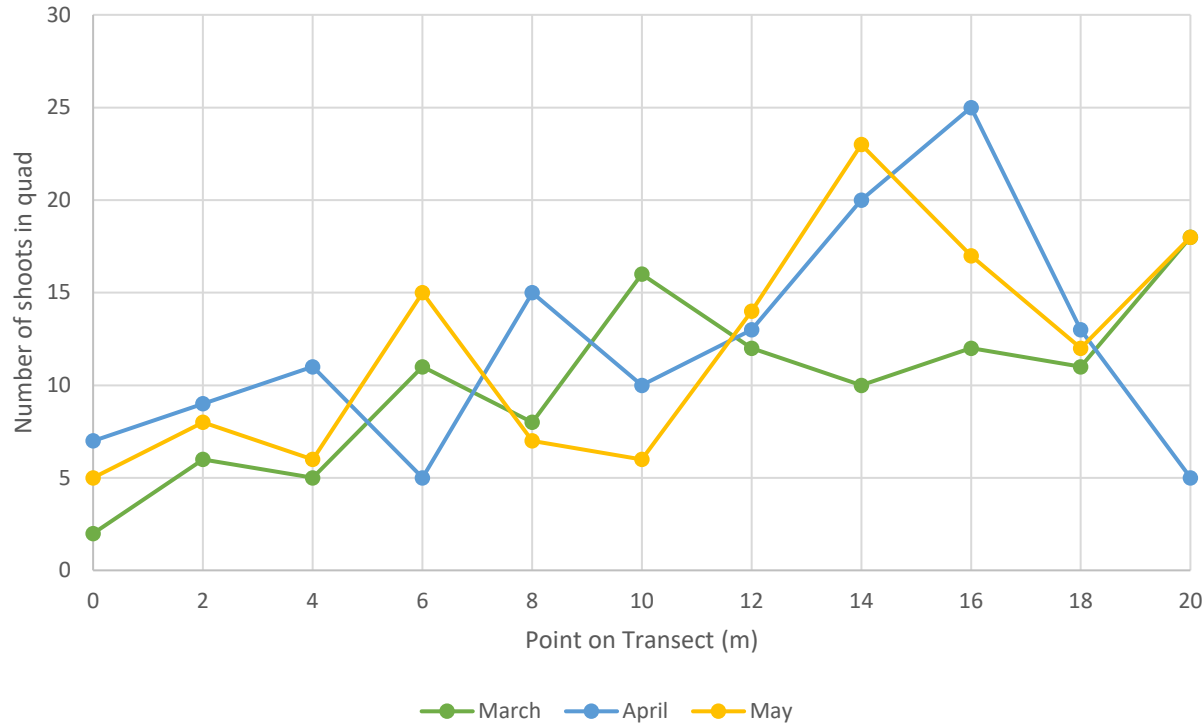


Figure 1. Total *Thalassia testudinum* (TTES) occurrence at each transect quadrat by month. Note that sites 0,2,and 4 had urchin line still on top of them in March, that line has since moved forward and/or dispersed.

Fig2

Monthly Transect Line Average TTES Shoot Height (mm)

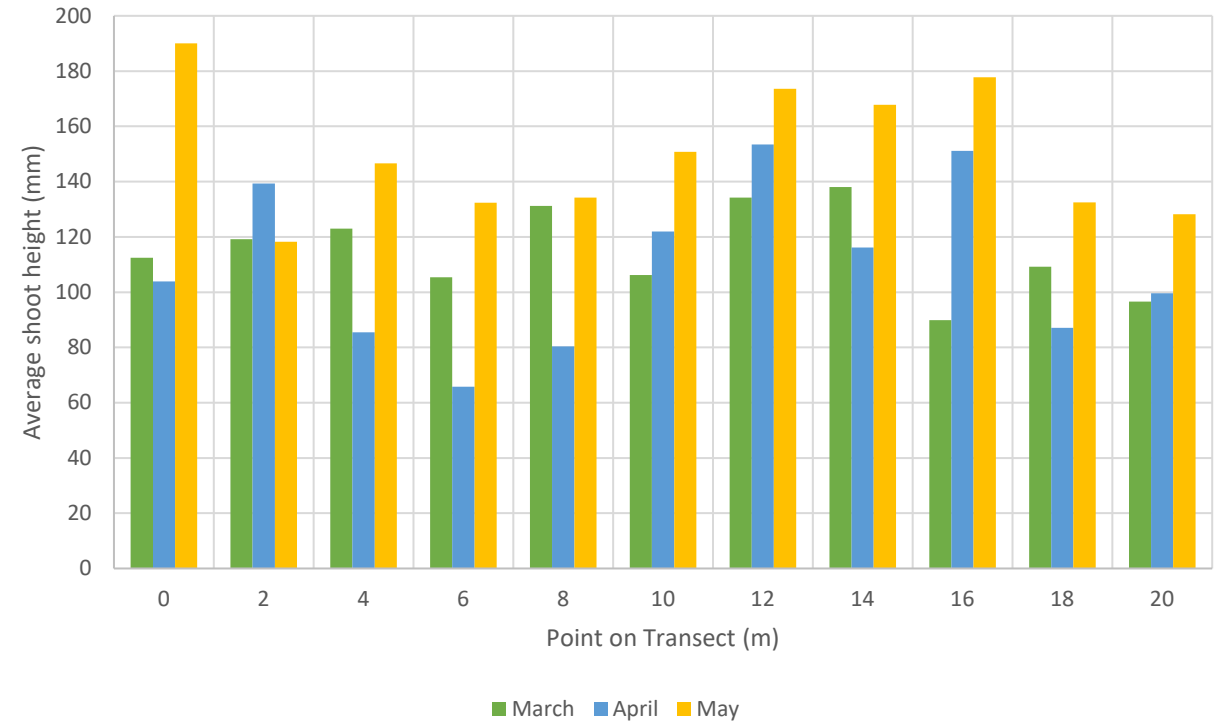


Figure 2. Average TTES height in mm of all shoots in the quad by month. Note seagrass growing season begins in May.

Ongoing Established Transect Data

Fig1

Monthly Transect Line Total SFIL Occurrence

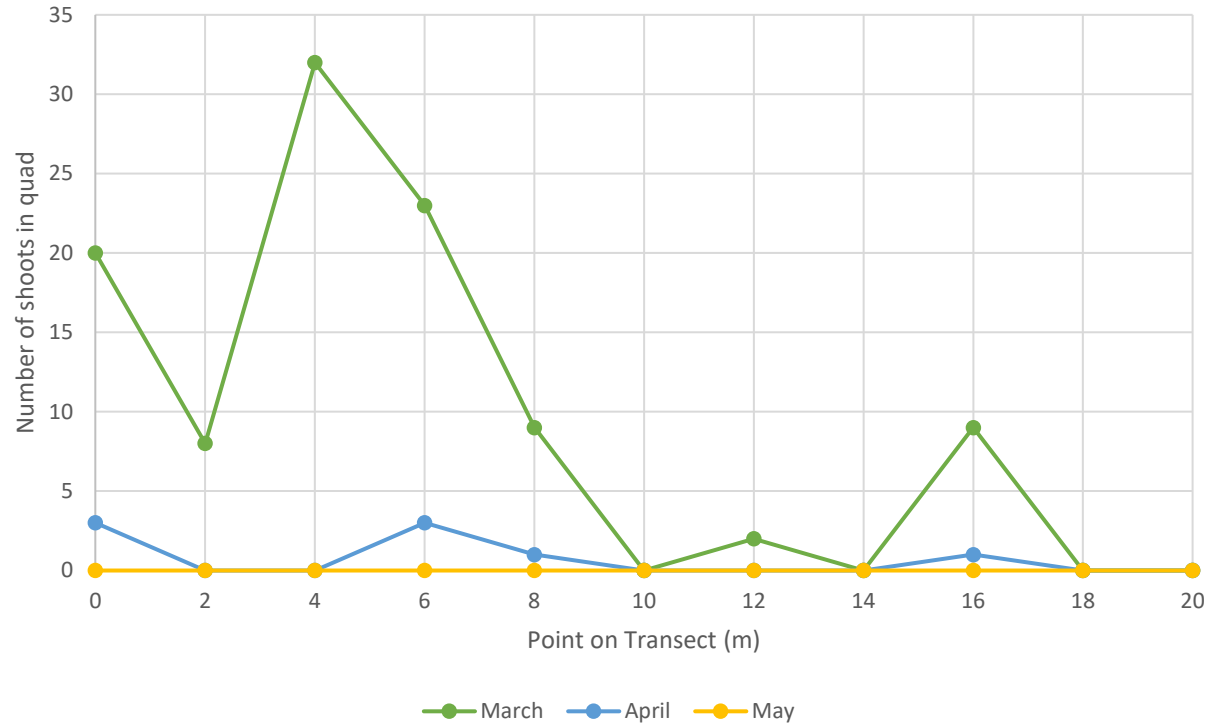


Figure 1. Total *Syringodium filiforme* (SFIL) occurrence at each transect quadrat by month. Note that SFIL was only found in 4 quads in April, no SFIL was found in any quad in May.

Fig2

Monthly Transect Line Average SFIL Shoot Height (mm)

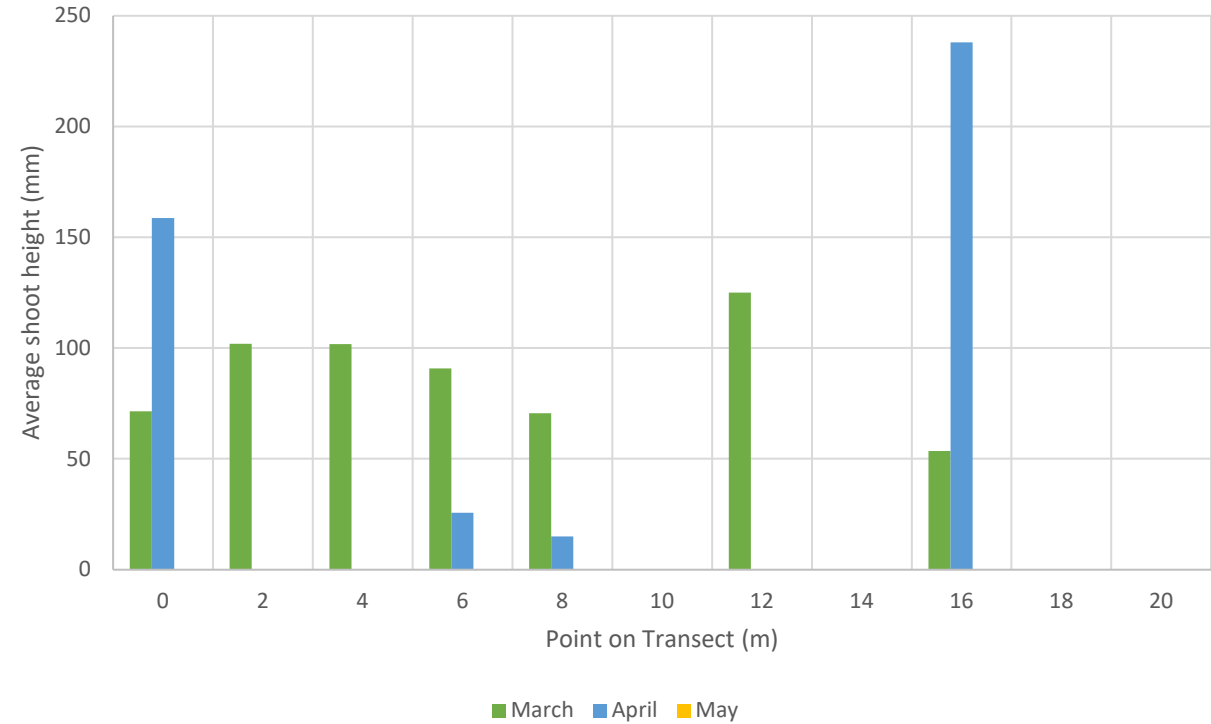
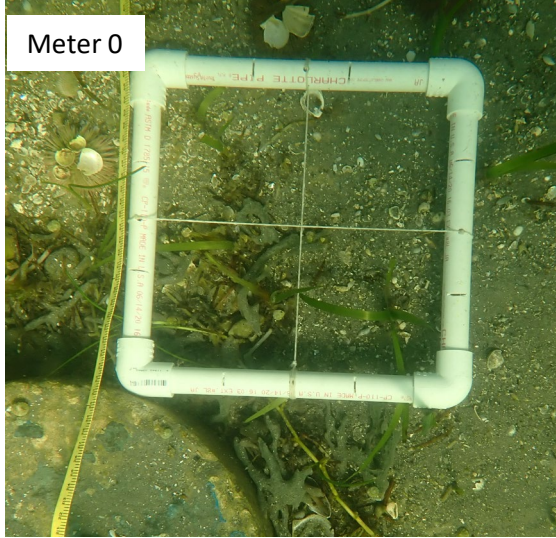


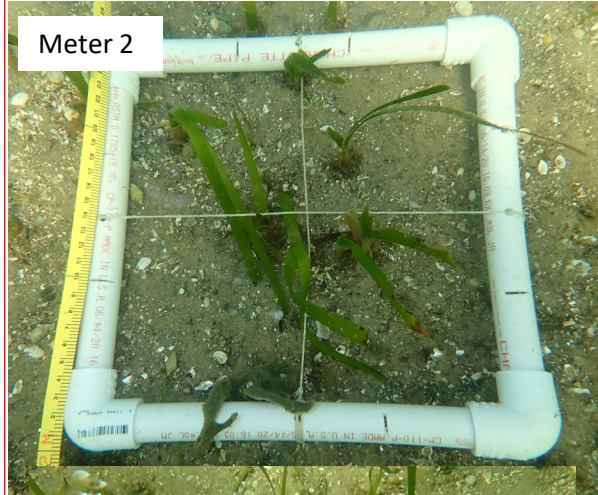
Figure 2. Average height in mm of all shoots in the quad by month. Note seagrass growing season begins in May. Note that SFIL was only found in 4 quads in April, no SFIL was found in any quad in May

April Transect Pictures

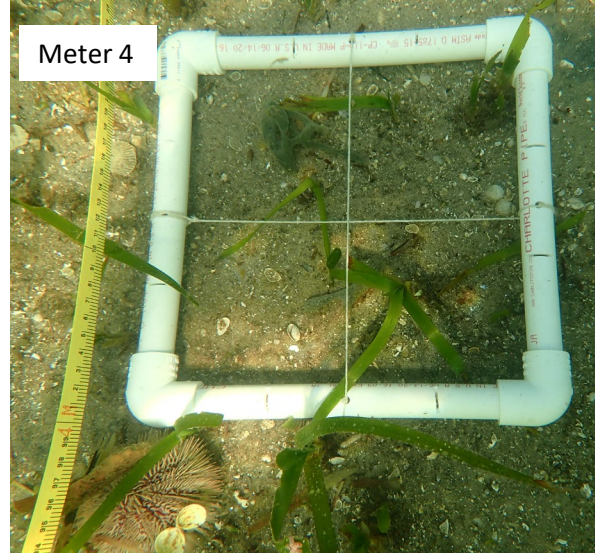
Meter 0



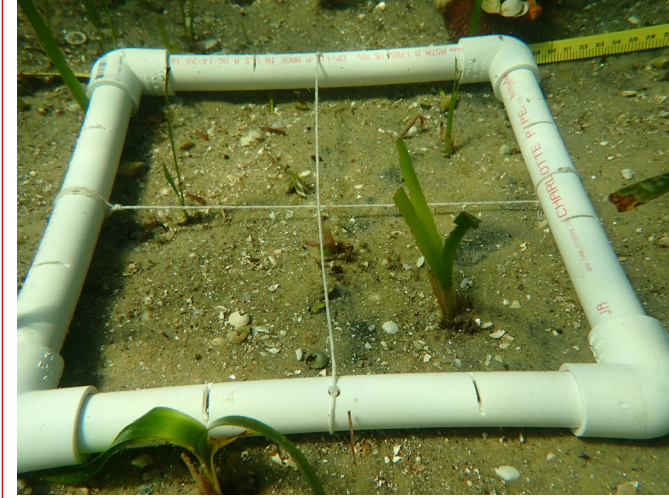
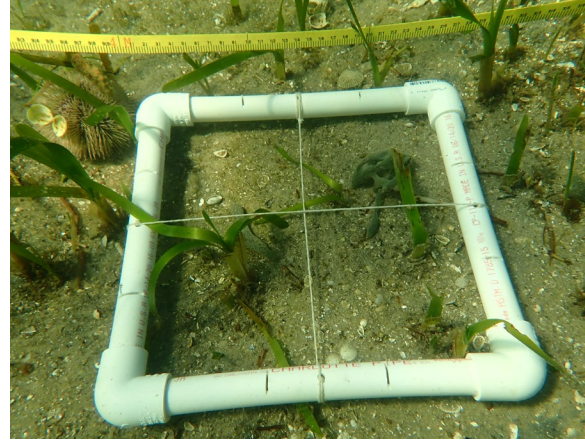
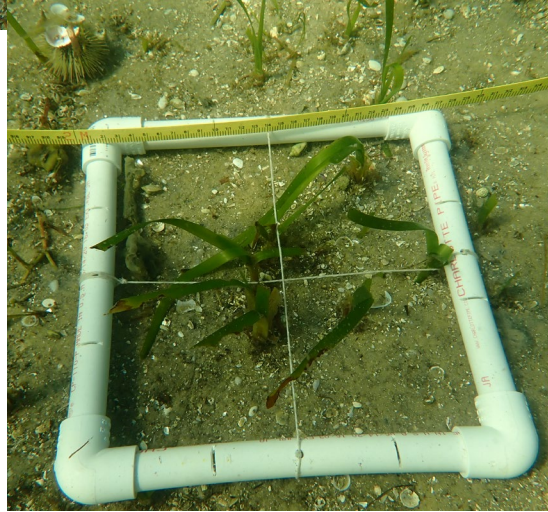
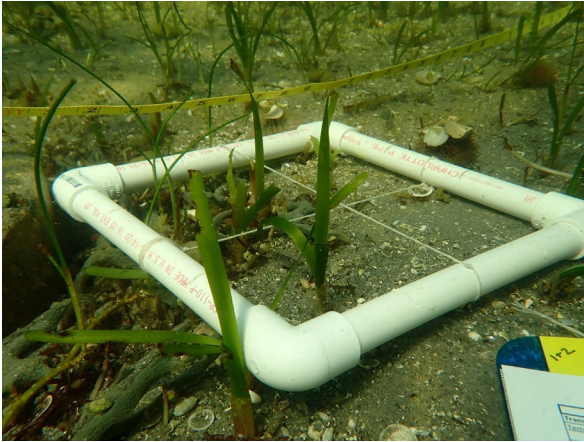
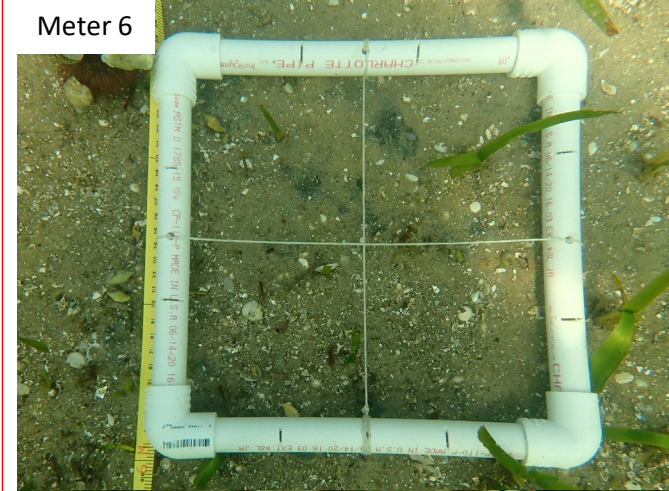
Meter 2



Meter 4



Meter 6



Meter 0 Data

Urchin Count: 0

Shoot count: 10

Average Height (mm): 120.3

Meter 2 Data

Urchin Count: 0

Shoot count: 9

Average Height (mm): 139.33

Meter 4 Data

Urchin Count: 0

Shoot count: 11

Average Height (mm): 85.45

Meter 6 Data

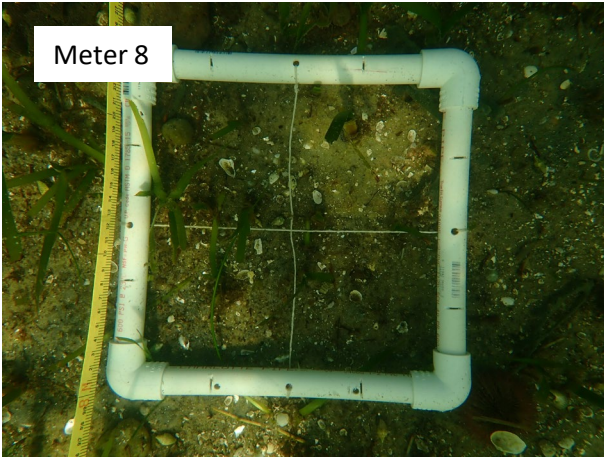
Urchin Count: 0

Shoot count: 8

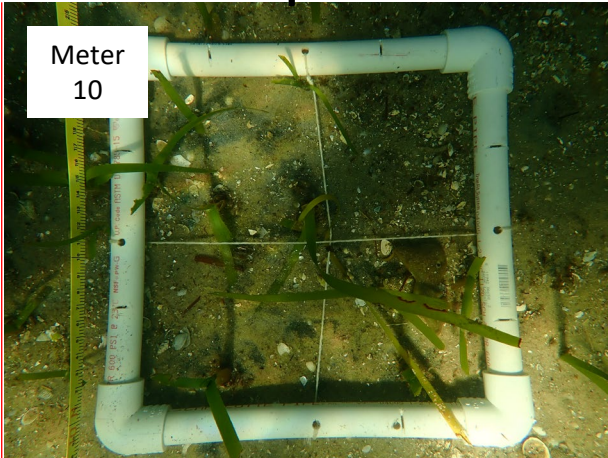
Average Height (mm): 50.75

April Transect Pictures

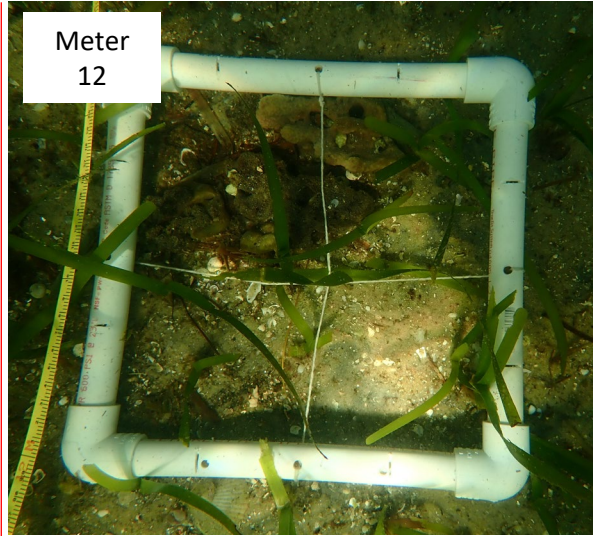
Meter 8



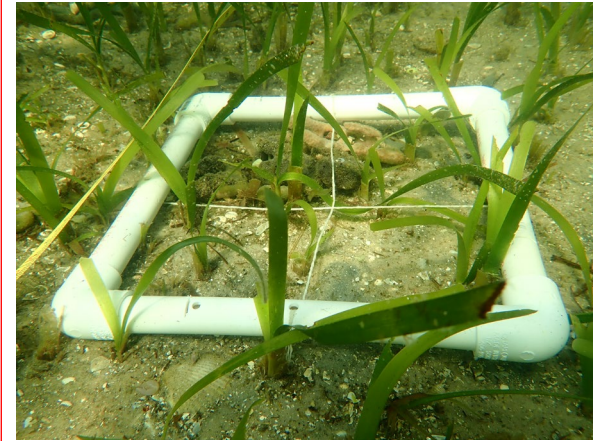
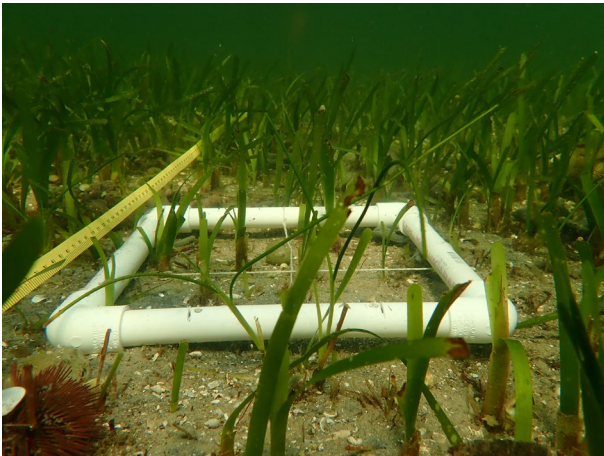
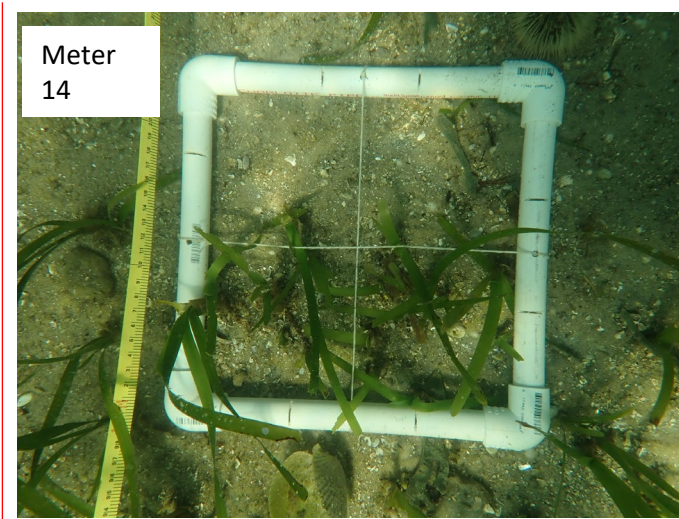
Meter 10



Meter 12



Meter 14



Meter 8 Data

Urchin Count: 0

Shoot count: 16

Average Height (mm): 76.25

Meter 10 Data

Urchin Count: 7

Shoot count: 10

Average Height (mm): 122

Meter 12 Data

Urchin Count: 0

Shoot count: 13

Average Height (mm): 153.456

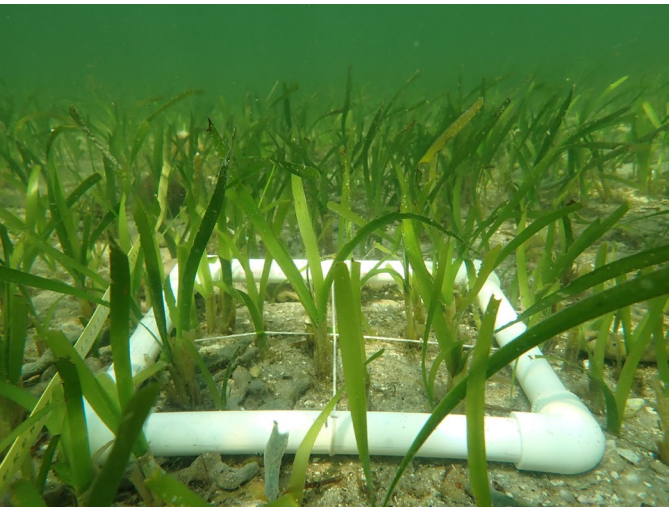
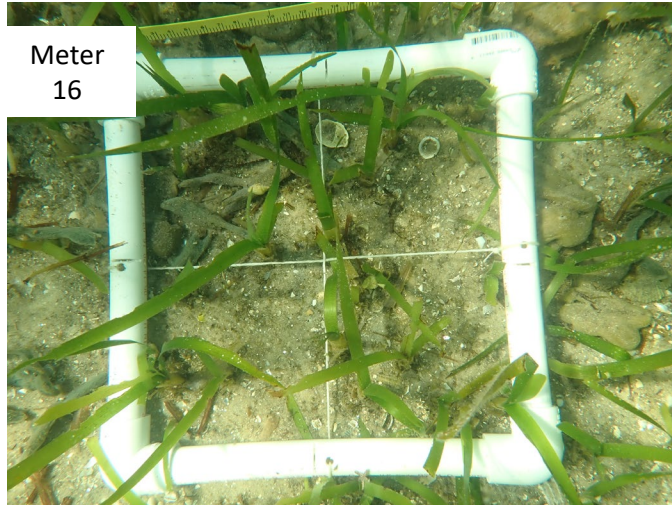
Meter 14 Data

Urchin Count: 0

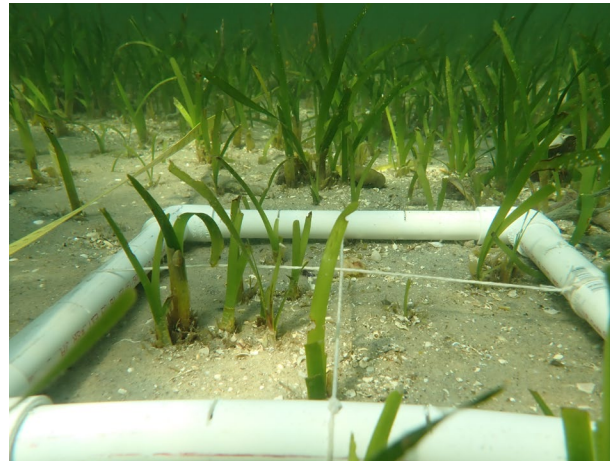
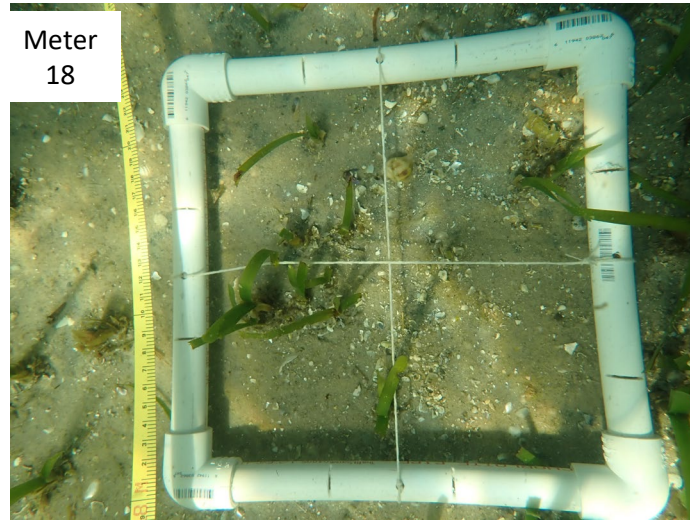
Shoot count: 20

Average Height (mm): 116.2

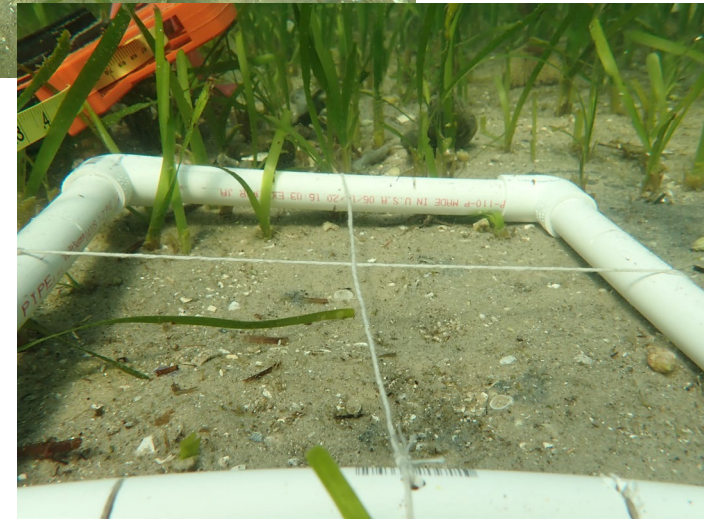
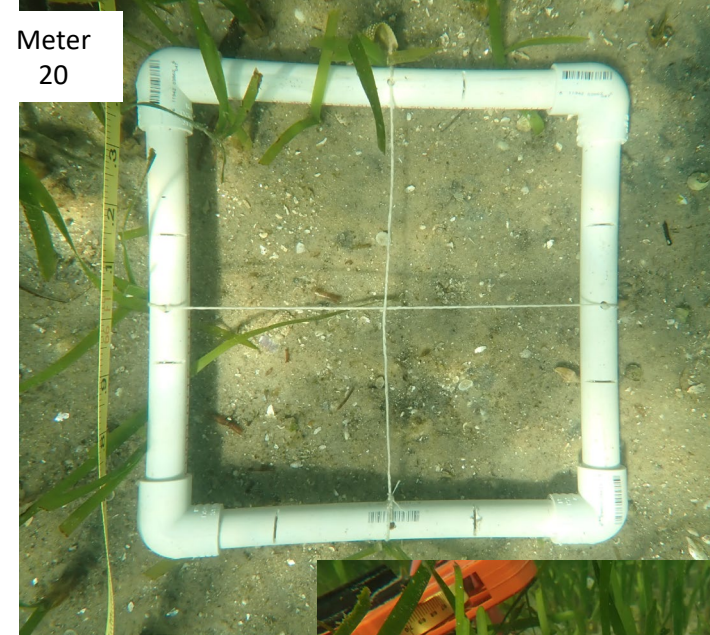
April Transect Pictures



Meter 16 Data
Urchin Count: 0
Shoot count: 26
Average Height (mm):154.4231



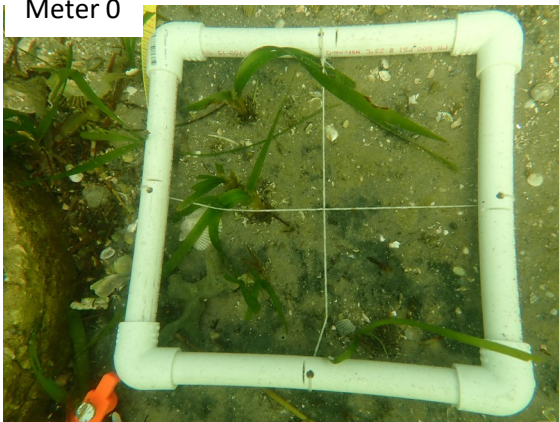
Meter 18 Data
Urchin Count:0
Shoot count: 13
Average Height (mm): 87.077



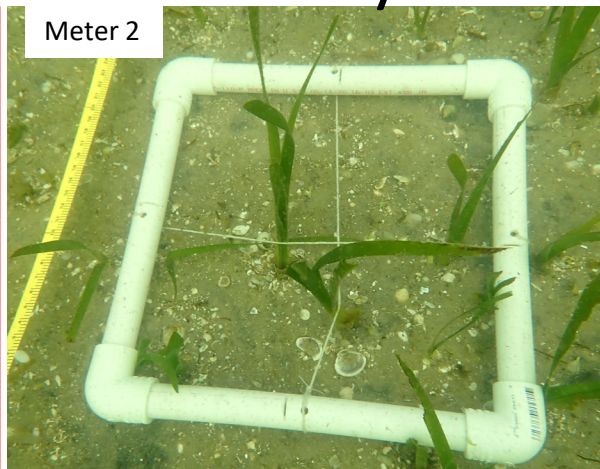
Meter 20 Data
Urchin Count:0
Shoot count: 5
Average Height (mm): 99.6

May Transect Pictures

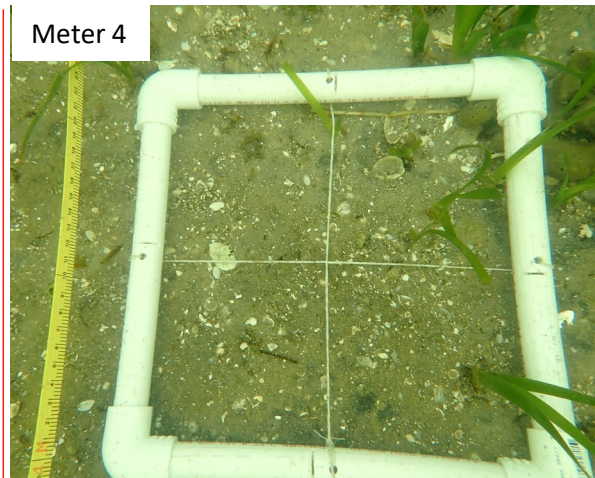
Meter 0



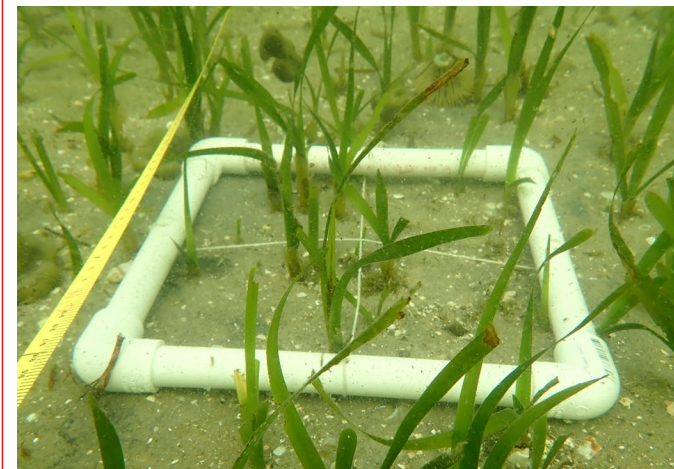
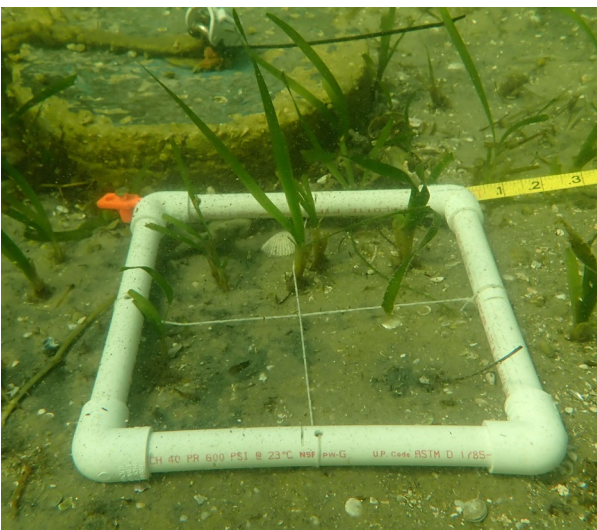
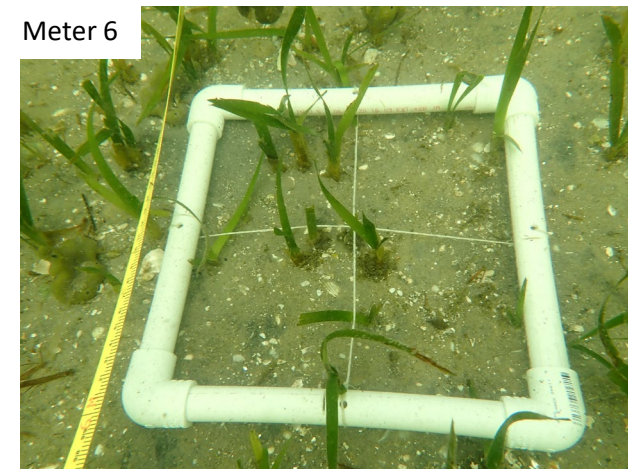
Meter 2



Meter 4



Meter 6



Meter 0 Data
Urchin Count: 0
Shoot count: 5
Average Height (mm): 190

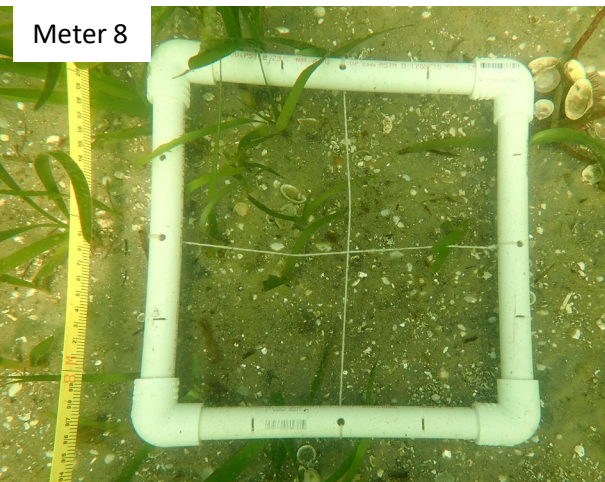
Meter 2 Data
Urchin Count: 0
Shoot count: 8
Average Height (mm): 118.25

Meter 4 Data
Urchin Count: 0
Shoot count: 6
Average Height (mm): 146.667

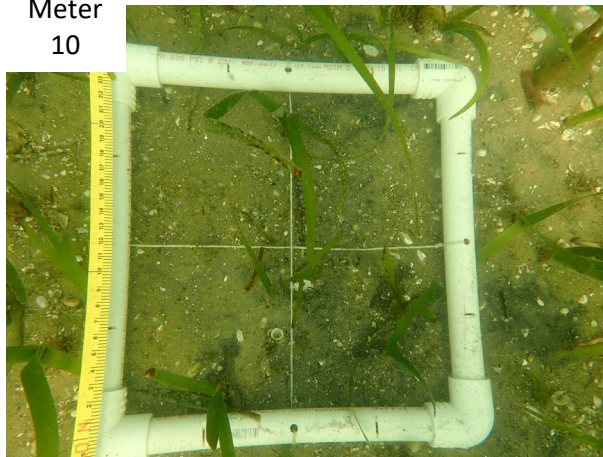
Meter 6 Data
Urchin Count: 0
Shoot count: 15
Average Height (mm): 132.333

May Transect Pictures

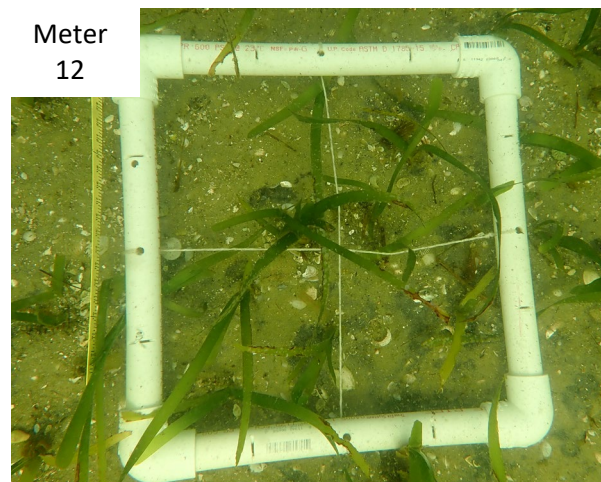
Meter 8



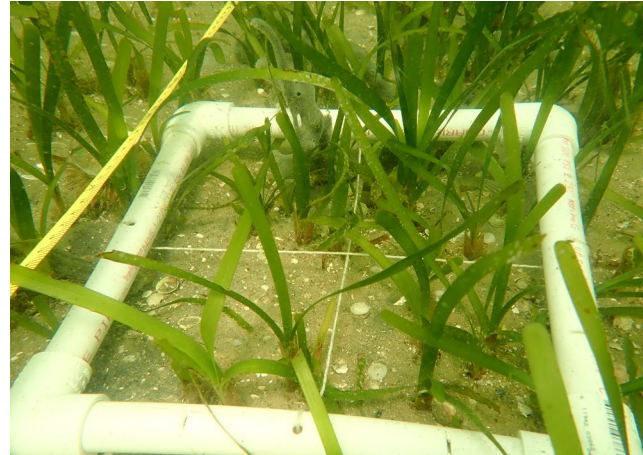
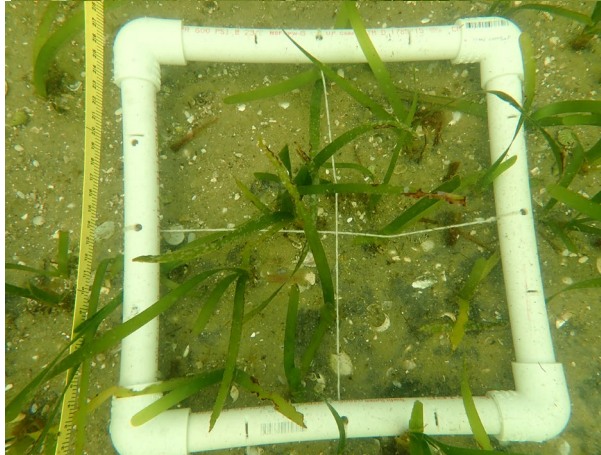
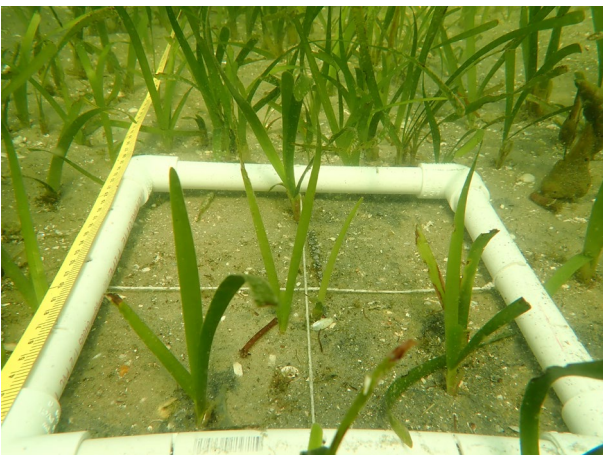
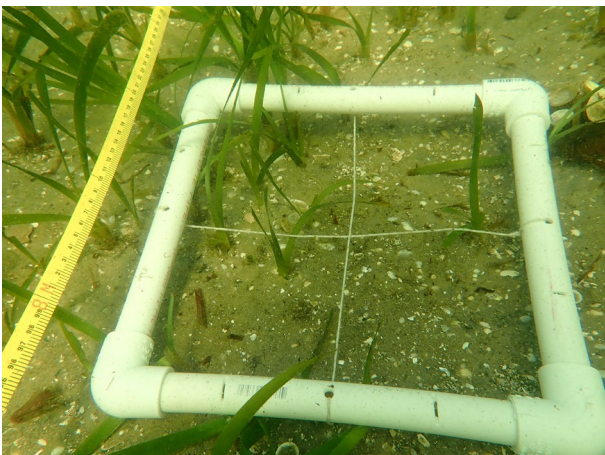
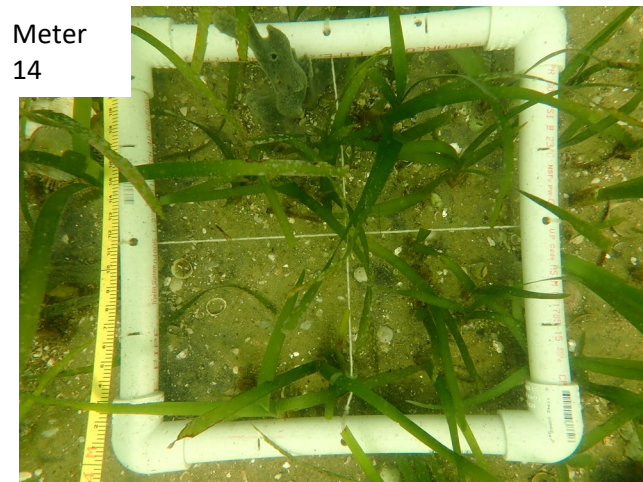
Meter 10



Meter 12



Meter 14



Meter 8 Data

Urchin Count: 0

Shoot count: 7

Average Height (mm): 134.286

Meter 10 Data

Urchin Count: 0

Shoot count: 6

Average Height (mm): 150.833

Meter 12 Data

Urchin Count: 0

Shoot count: 14

Average Height (mm): 173.571

Meter 14 Data

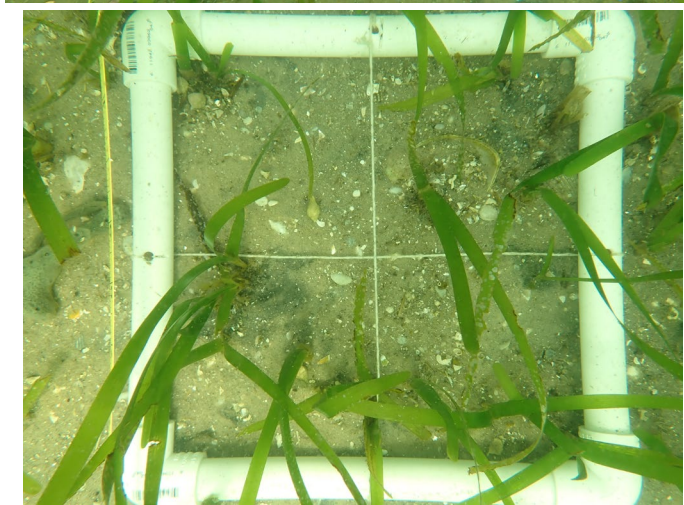
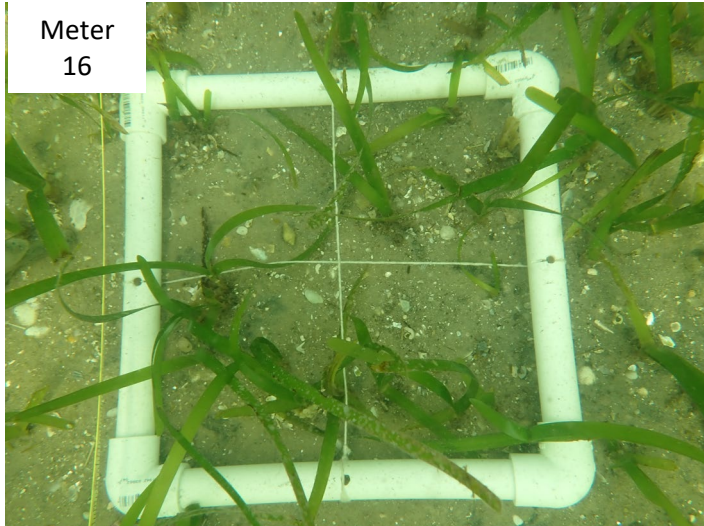
Urchin Count: 0

Shoot count: 23

Average Height (mm): 167.87

May Transect Pictures

Meter
16



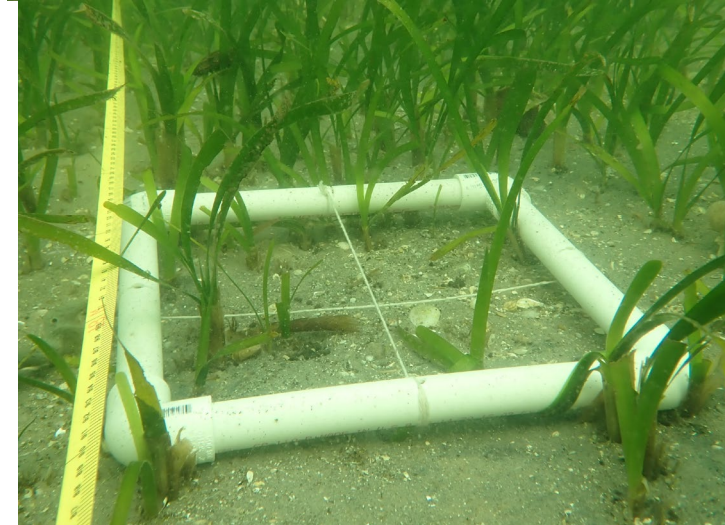
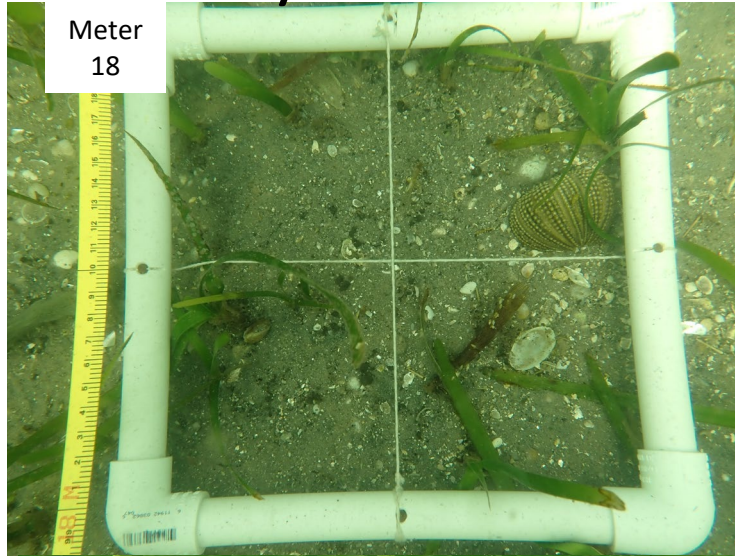
Meter 16 Data

Urchin Count: 0

Shoot count: 17

Average Height (mm): 177.76

Meter
18



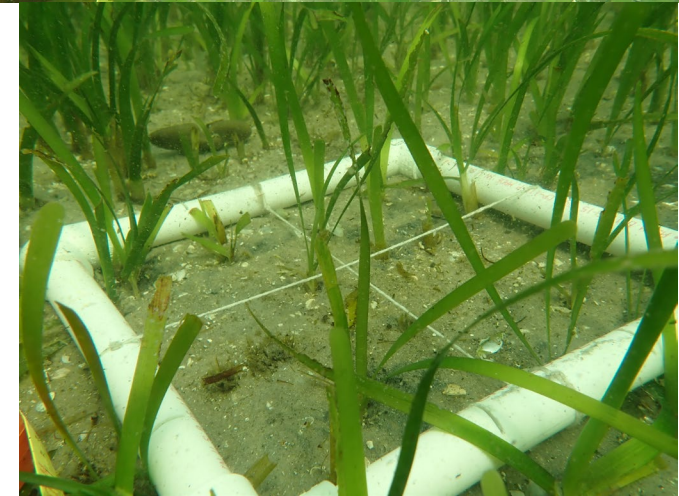
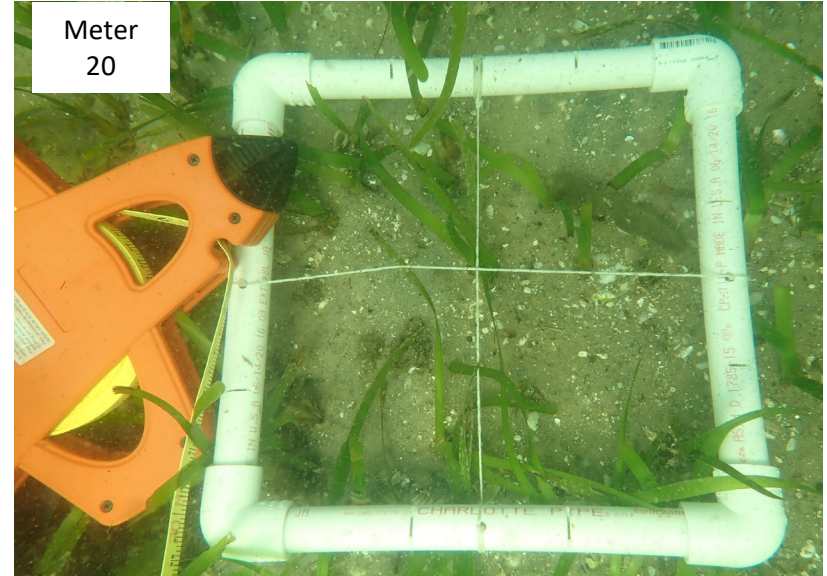
Meter 18 Data

Urchin Count: 0

Shoot count: 12

Average Height (mm): 132.5

Meter
20



Meter 20 Data

Urchin Count: 0

Shoot count: 18

Average Height (mm): 128.22

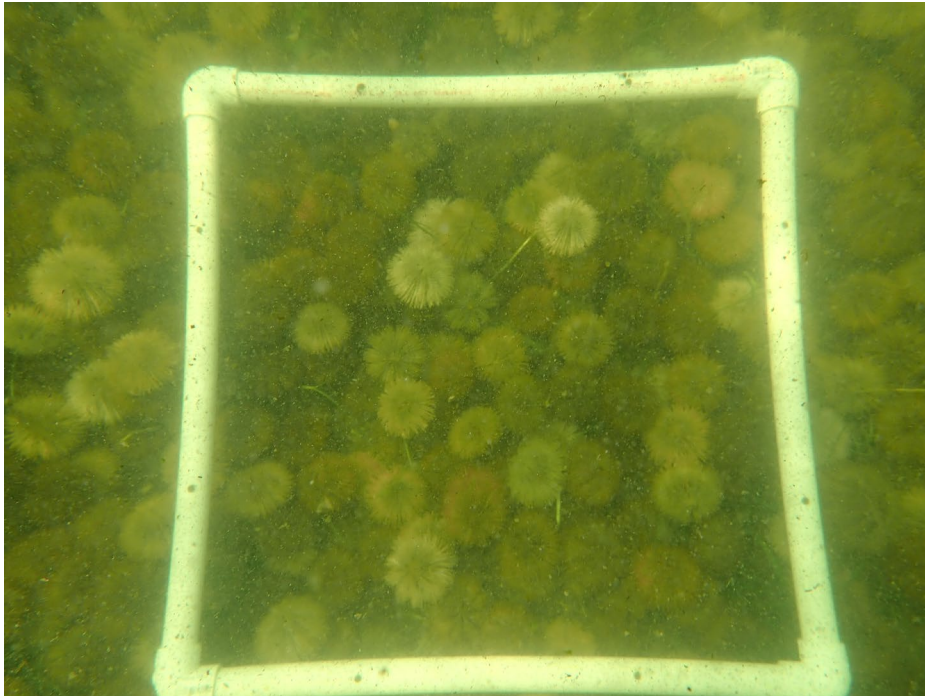
Extra Urchin Counts

UrchCo01

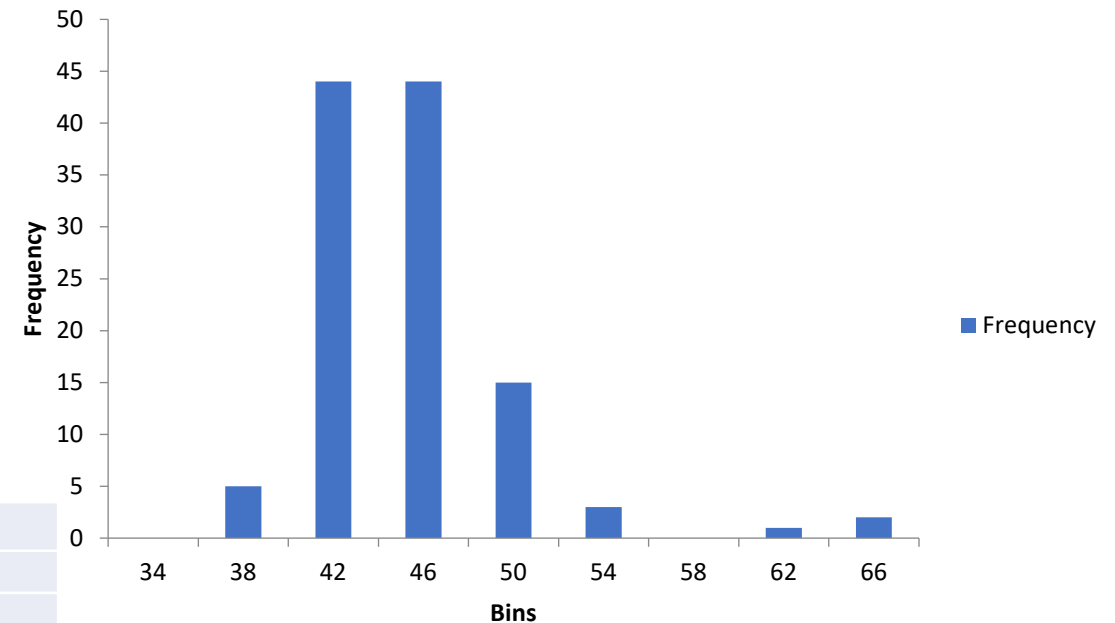
3/09/2023

GPS:29.80338 -83.6267

In an effort to collect more urchin per quad data, an extra quad was taken near the transect 1 site in the urchin front. The quad was randomly thrown over the front and all urchins inside were collected and measured. Quadrat named UrchCo1, more urchin count quads may be taken moving forward.



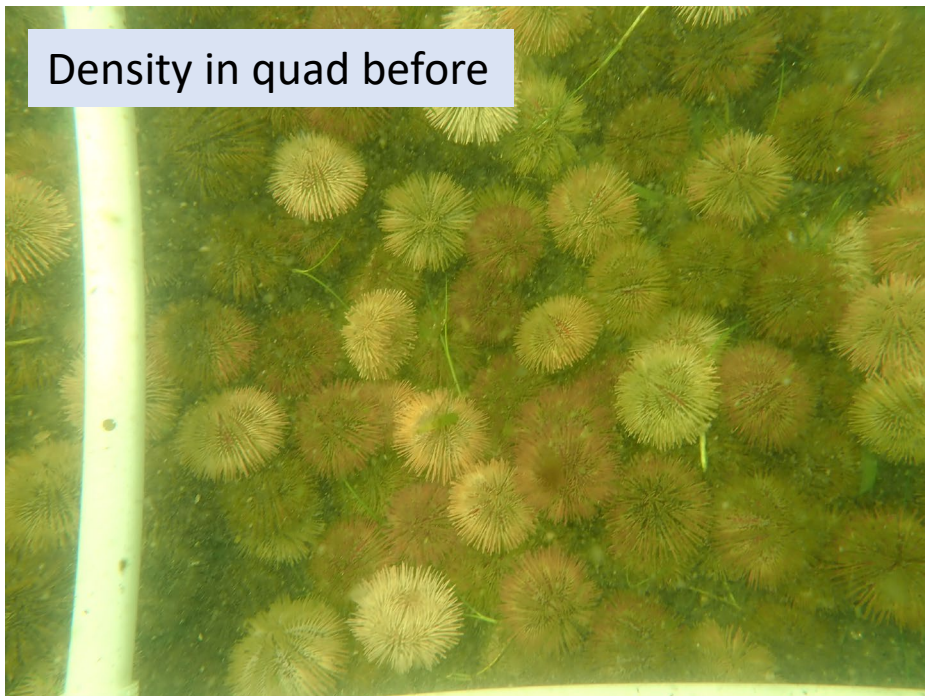
Urchin Count Quad 1 test diameters (mm)



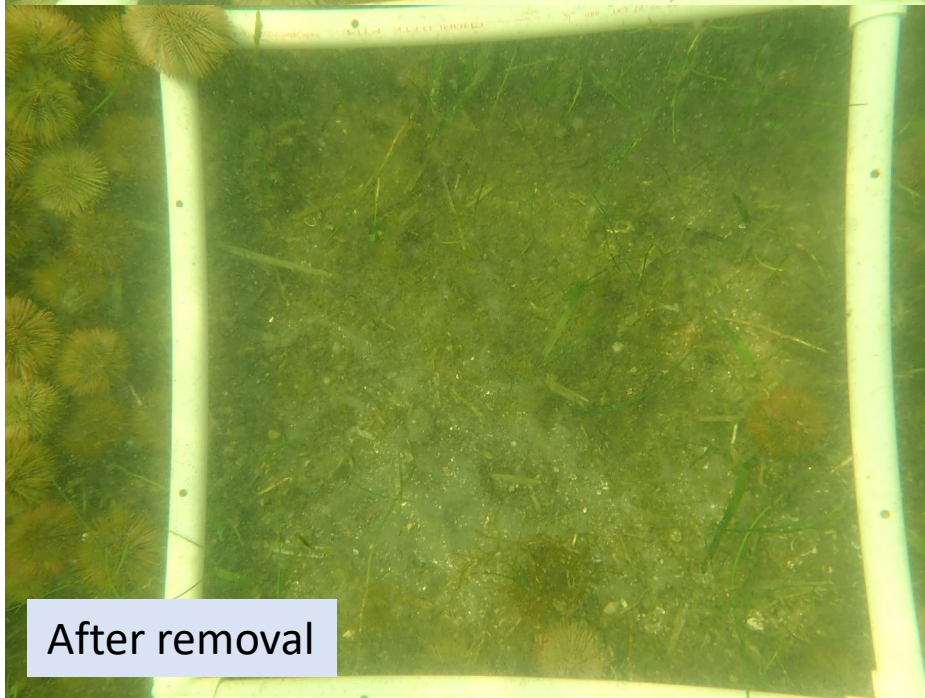
Urchin_test (mm)	
Mean	43.44825
Standard Deviation	4.605907
Range	28.46
Minimum	35.85
Maximum	64.31
Count	114

UrchCo01 pictures

Density in quad before



After removal



View in quad after removal, you can see some grass shoots and the front around the removed area.

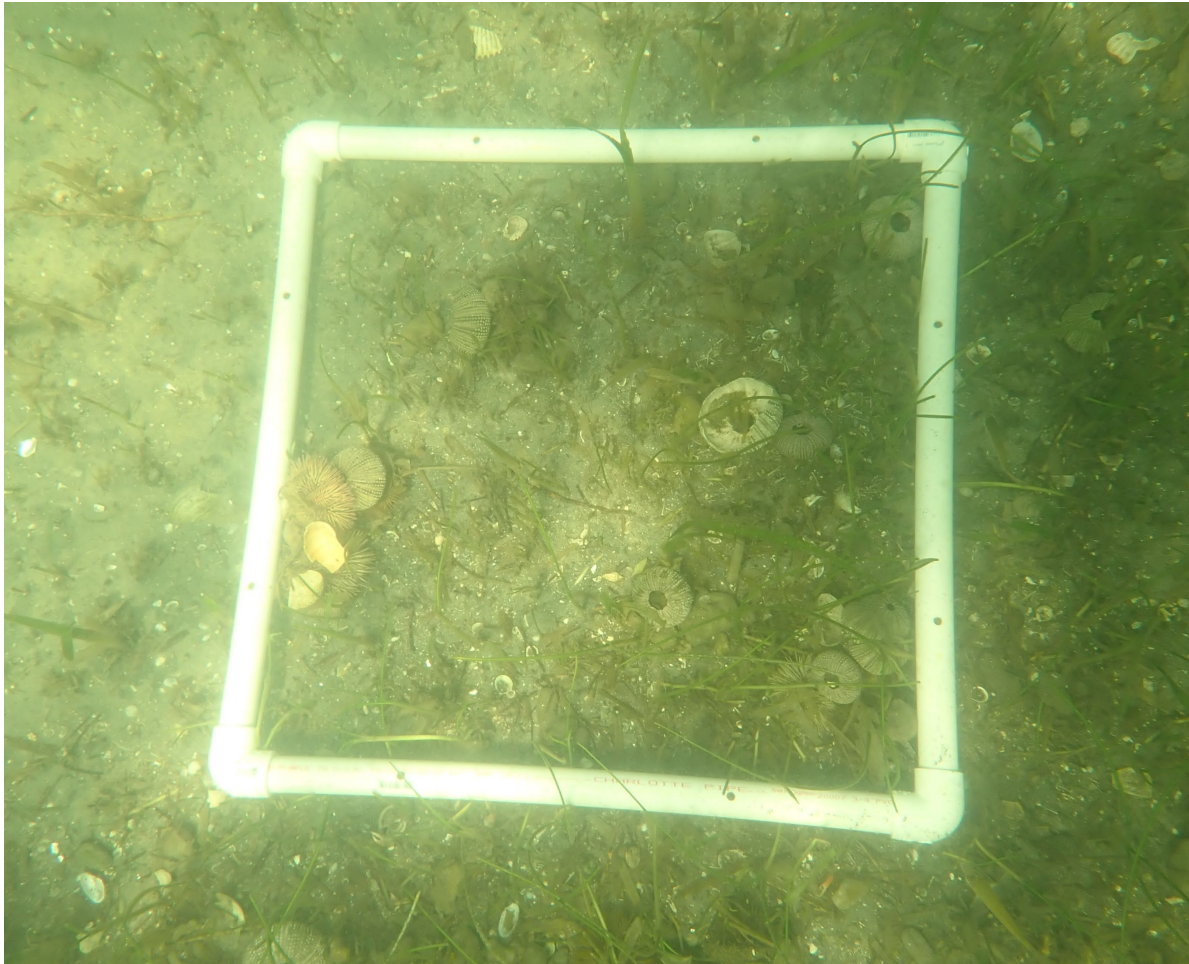
Extra Urchin Counts

UrchCo02

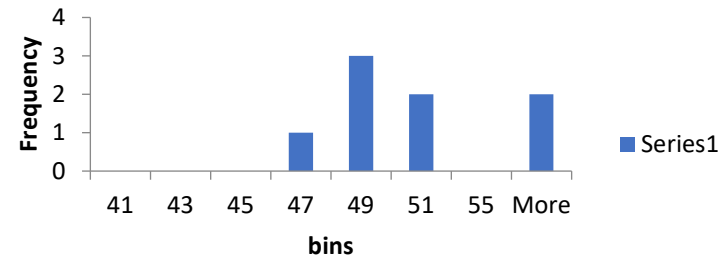
5/16/2023

GPS: 29.80412, -83.6225

Urchin Count Quad 02 was taken in May near the same location as UrchCo01. These quads were also taken around the established transect line. UrchCo02 had a significant number of dead urchins in and around it, there was also a slight line between grazed and ungrazed grasses. Both live urchin and dead urchin tests were measured. Dead urchins were only measured if their test was still complete.

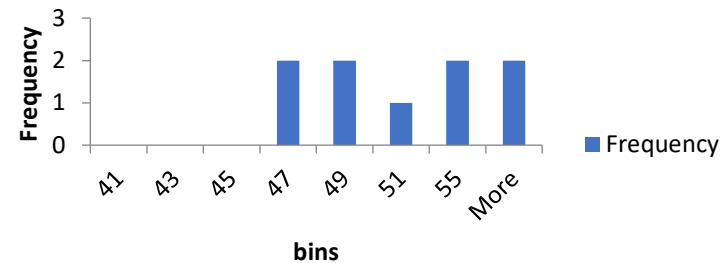


UrchCo02 Living Test Diameters (mm)



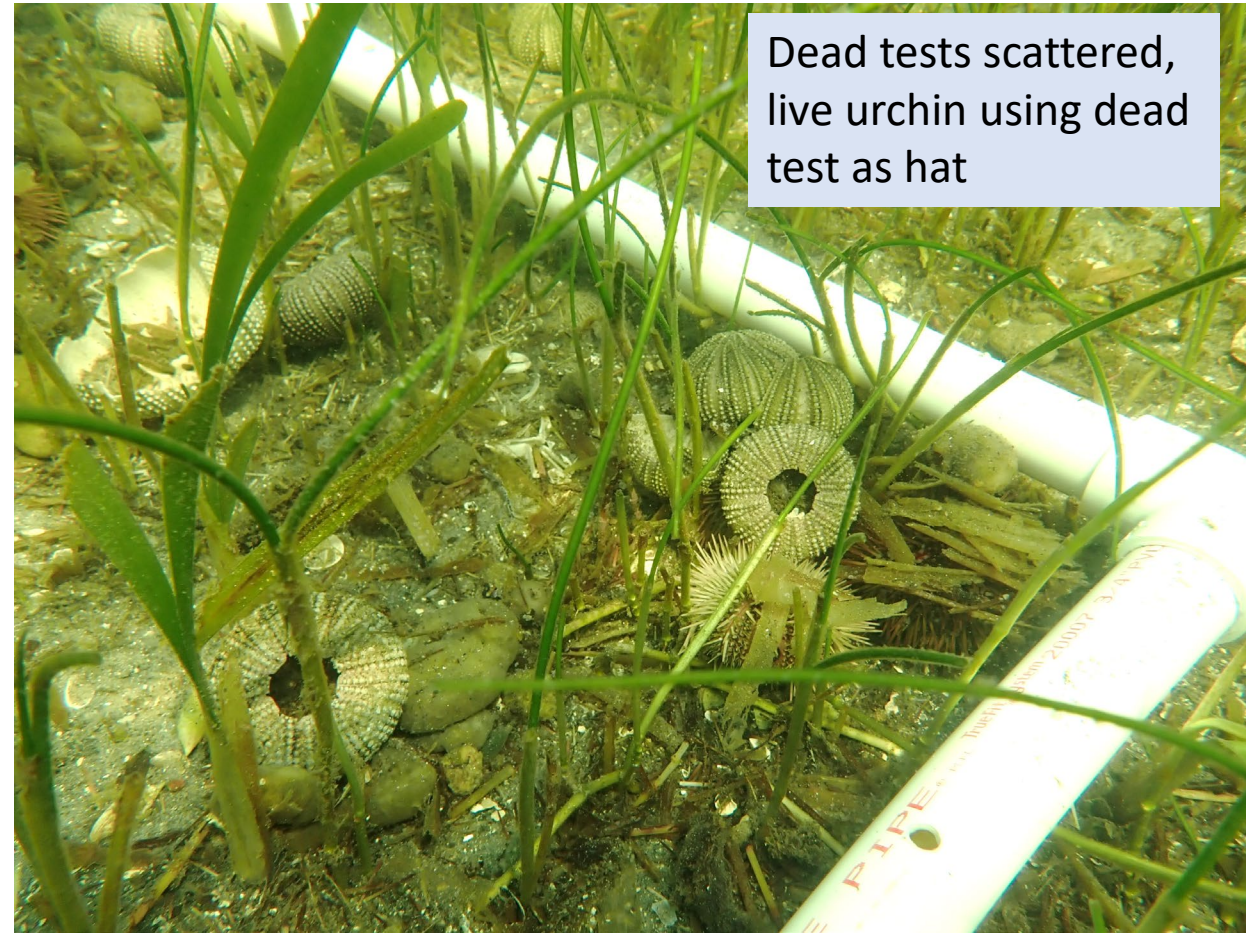
bins	Frequency	UrchCo02 Live Diameters (mm)	
41	0	Mean	49.775
43	0	Standard Deviation	7.494621
45	0	Range	20.08
47	1	Minimum	42.36
49	3	Maximum	62.44
51	2	Count	8
55	0		
More	2		

UrchCo02 Dead Test Diameters (mm)



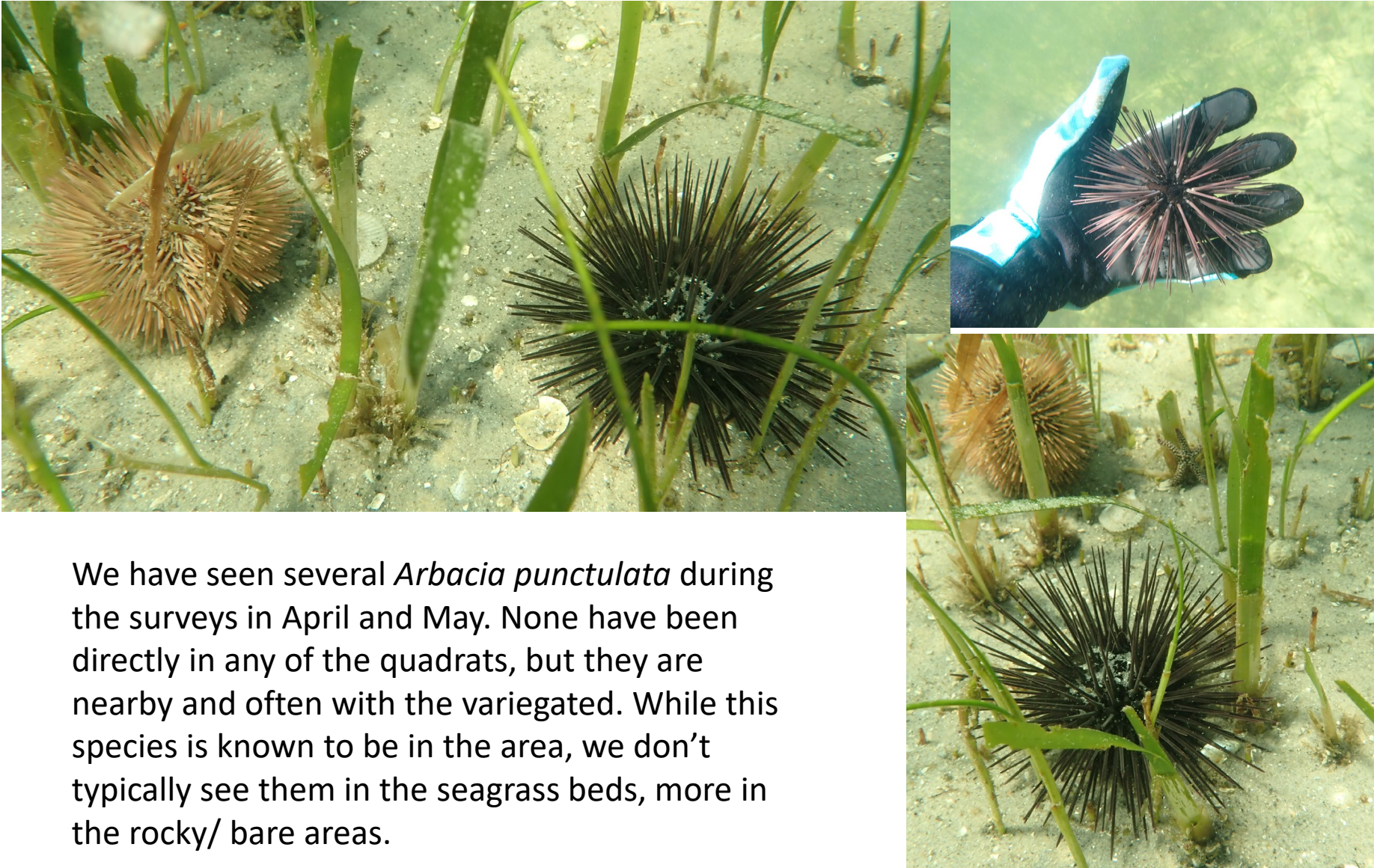
bins	Frequency	UrchCo02 Dead Diameters (mm)	
41	0	Mean	50.73889
43	0	Standard Deviation	8.857735
45	0	Range	27.66
47	2	Minimum	41.15
49	2	Maximum	68.81
51	1	Count	9
55	2		
More	2		

UrchCo02 pictures

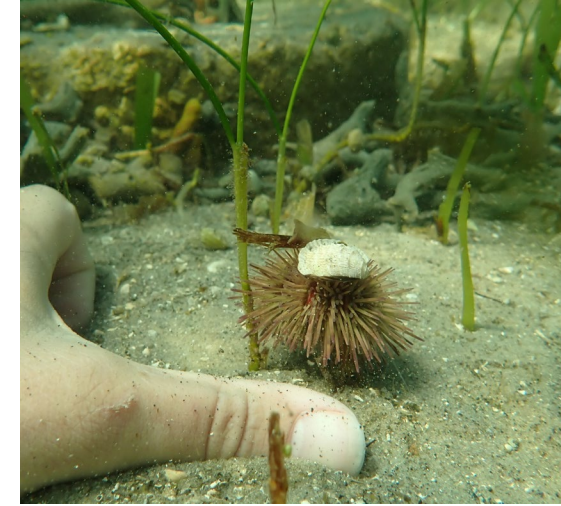


Dead tests scattered,
live urchin using dead
test as hat

Other notes from the field:



We have seen several *Arbacia punctulata* during the surveys in April and May. None have been directly in any of the quadrats, but they are nearby and often with the variegated. While this species is known to be in the area, we don't typically see them in the seagrass beds, more in the rocky/ bare areas.



Small urchin found, estimated less than 3cm. Was not in a quad and thus not recorded.



Good number of scallops in the area, they have lost quite a bit of their hiding space.



Next urchin surveys will occur in June.
Still working on getting aerial imagery to map the extent of damage.

Data collected by Big Bend Seagrasses Aquatic Preserves.

Please contact Kate Suchanec at Katherine.Suchanec@floridadep.gov with any questions, comments, or requests for further data & pictures.

Special thanks to Cheryl Clark, DEP central office, for assisting with urchin measurements in February and March.