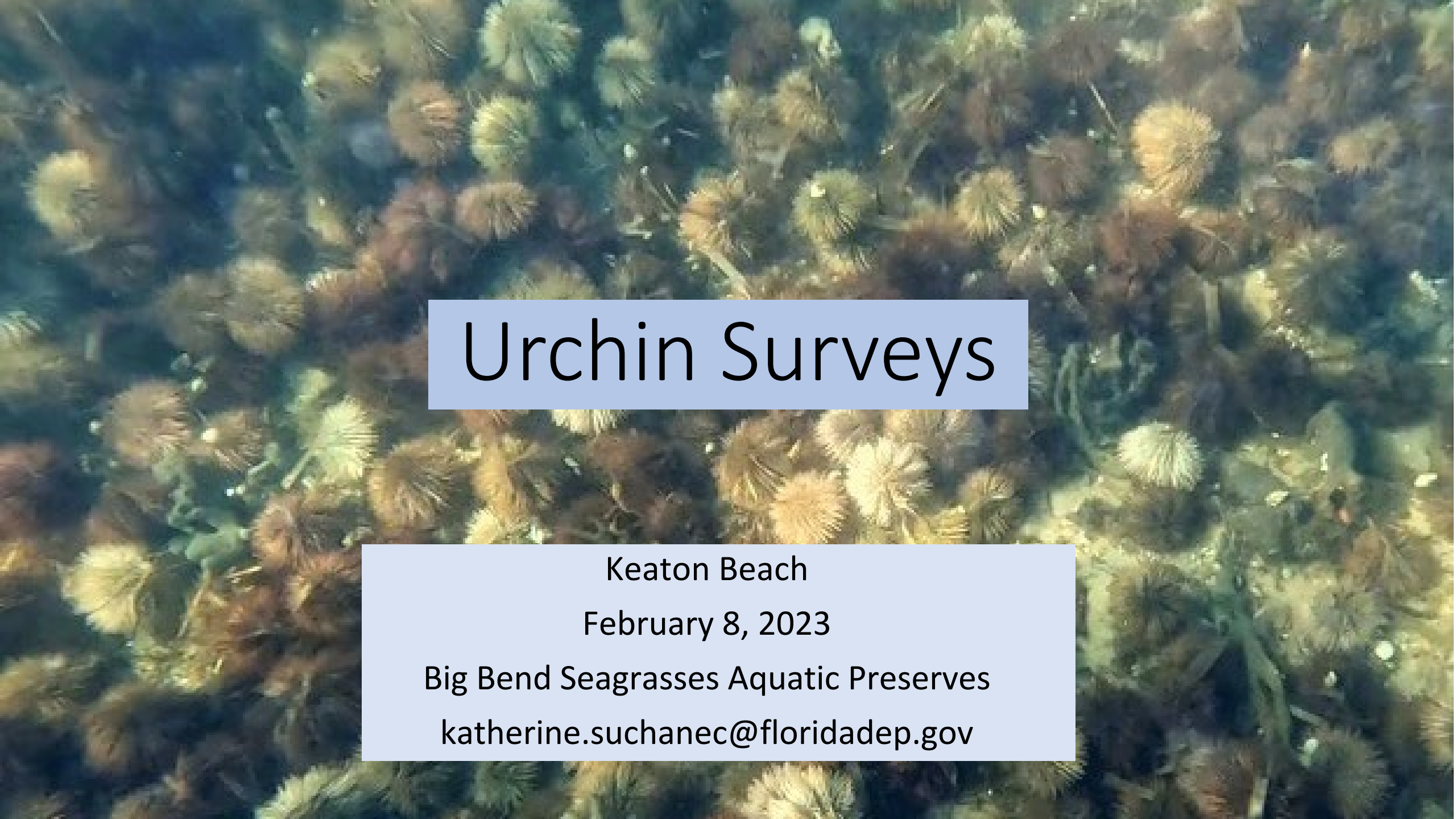


An underwater photograph showing a dense field of sea urchins on a seagrass bed. The urchins are mostly brown and yellow, with some green ones. The seagrass is green and brown. The water is clear and blue.

Urchin Surveys

Keaton Beach

February 8, 2023

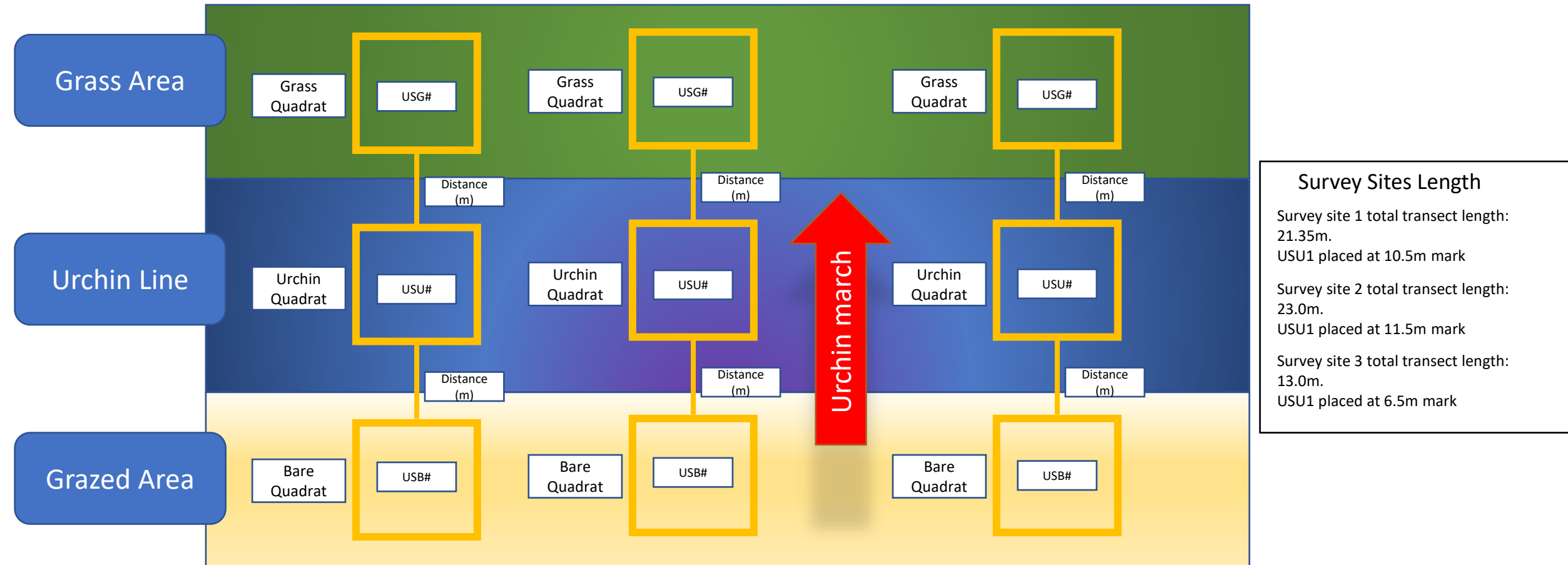
Big Bend Seagrasses Aquatic Preserves

katherine.suchanec@floridadep.gov



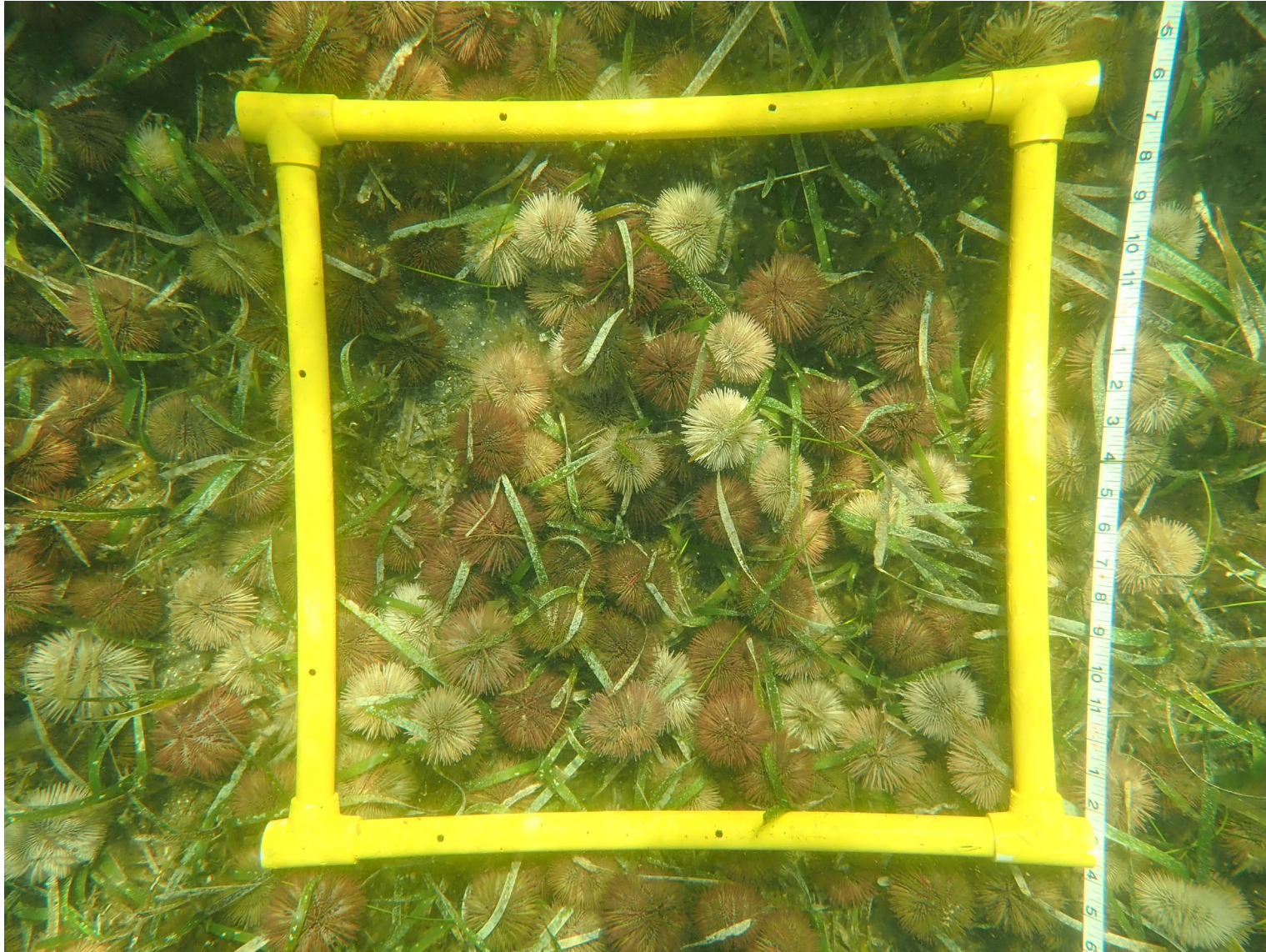
GPS coordinates taken while following the urchin line on 8 February 2023. The line extends from each end. Staff had limited time to follow the full length. Aerial mapping is proposed to obtain better imagery. Urchin line is orange. Green markers are continuous seagrass monitoring stations used yearly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

Survey Design



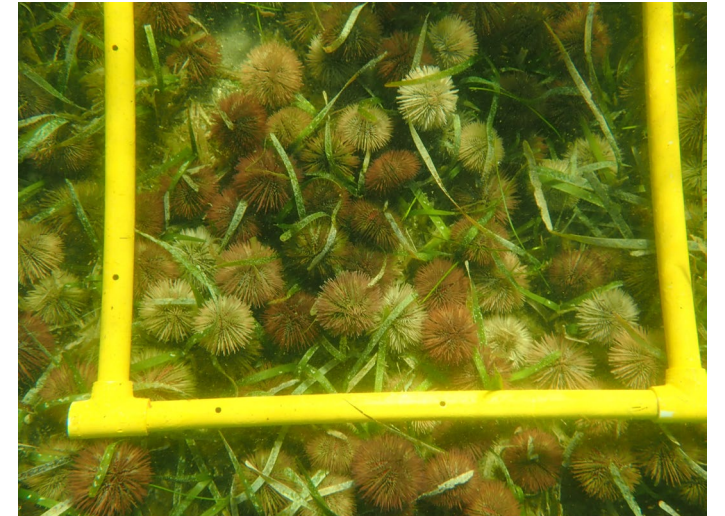


Urchin Survey Quad 1



Full quad (0.25m²)

USU1
GPS: 29.80819, -83.6242 in
decimal degrees

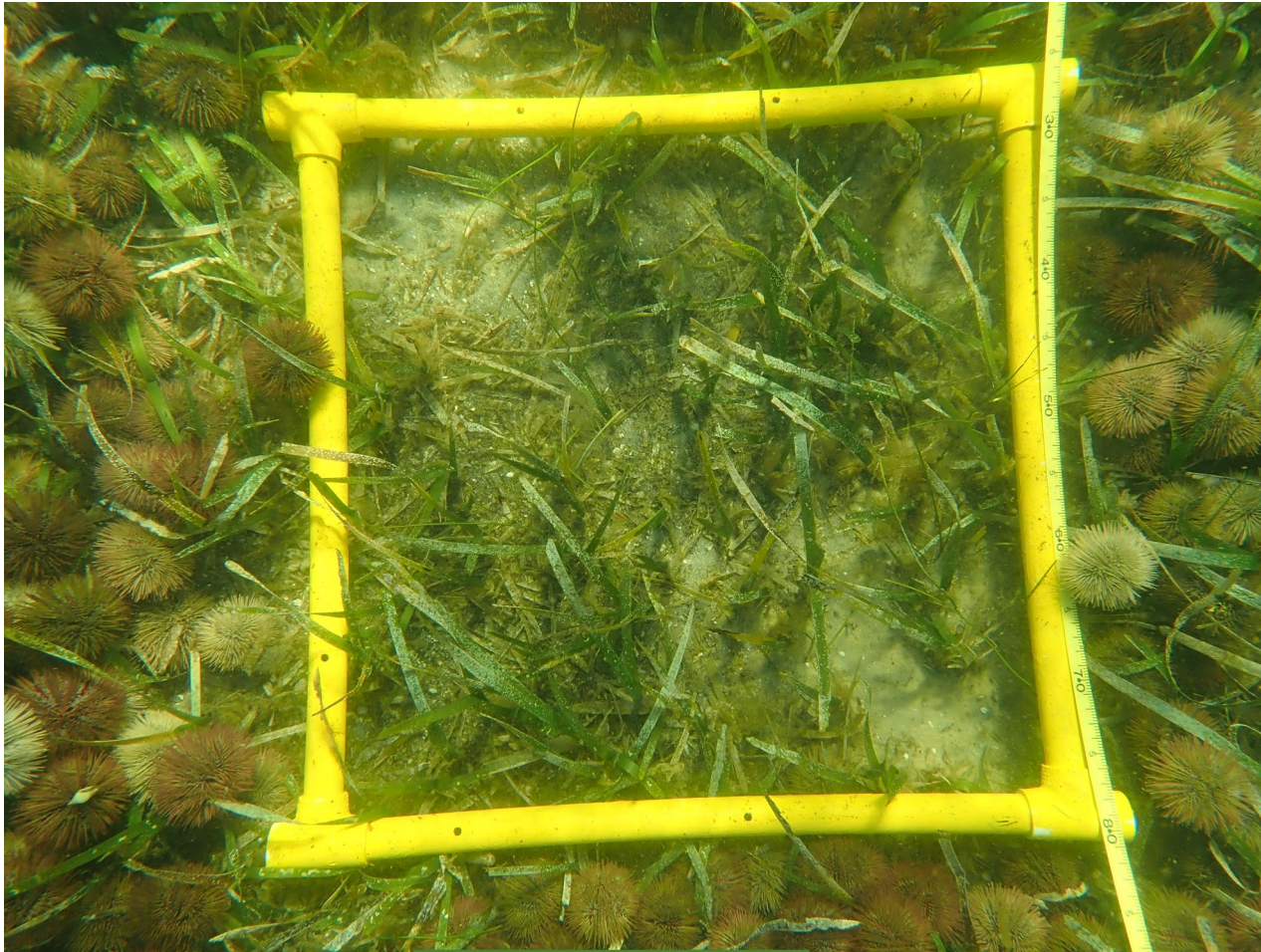


Closeup

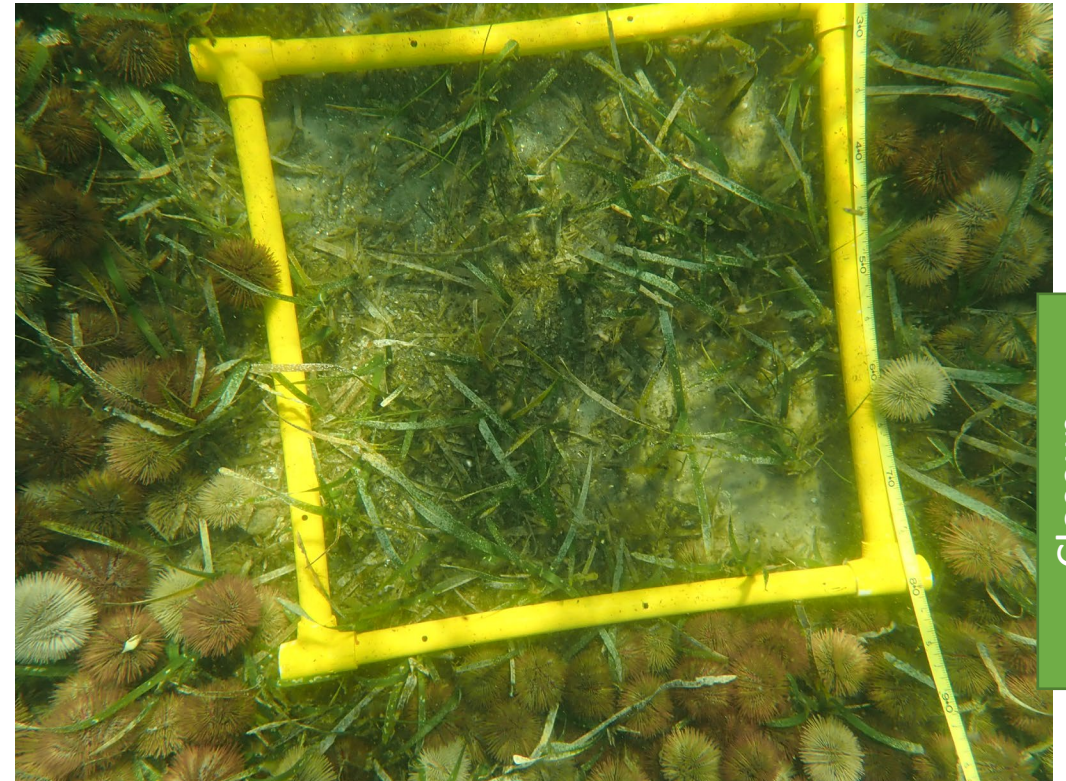
Urchin Survey Quad 1

USU1

GPS: 29.80819, -83.6242



Full quad (0.25m²)



Closeup

Urchin Survey Quad 1

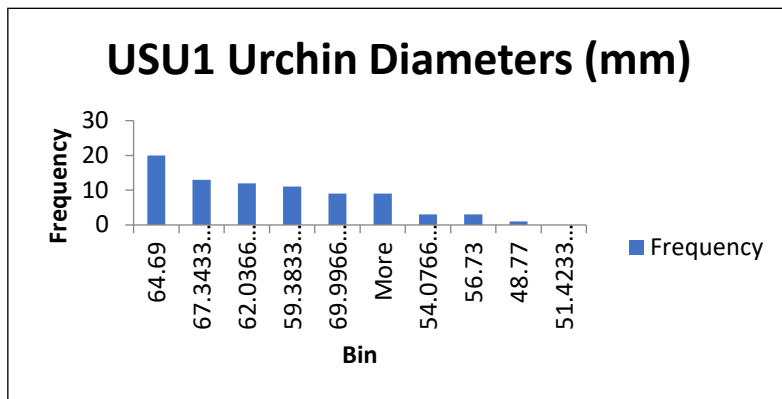
USU1

GPS: 29.80819, -83.6242

TOTAL_SAV_PER CENT_COVER	TOTAL_GRASS_P ERCENT	TOTAL_MACRO ALGAE_PERCEN T	EPIPHYTE_DENS ITY	SEDIMENT_TYPE	Rhizomes
30	30	0	Moderate	Sand Mud Shell	Yes

SPECIES	PERCENT_ COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)
TTES	25	20.5	9.1	15.2
SFIL	5	24	27	6

Temp	DO (mg/L/)	Salinity	pH
17.1	8.12	32.23	7.93



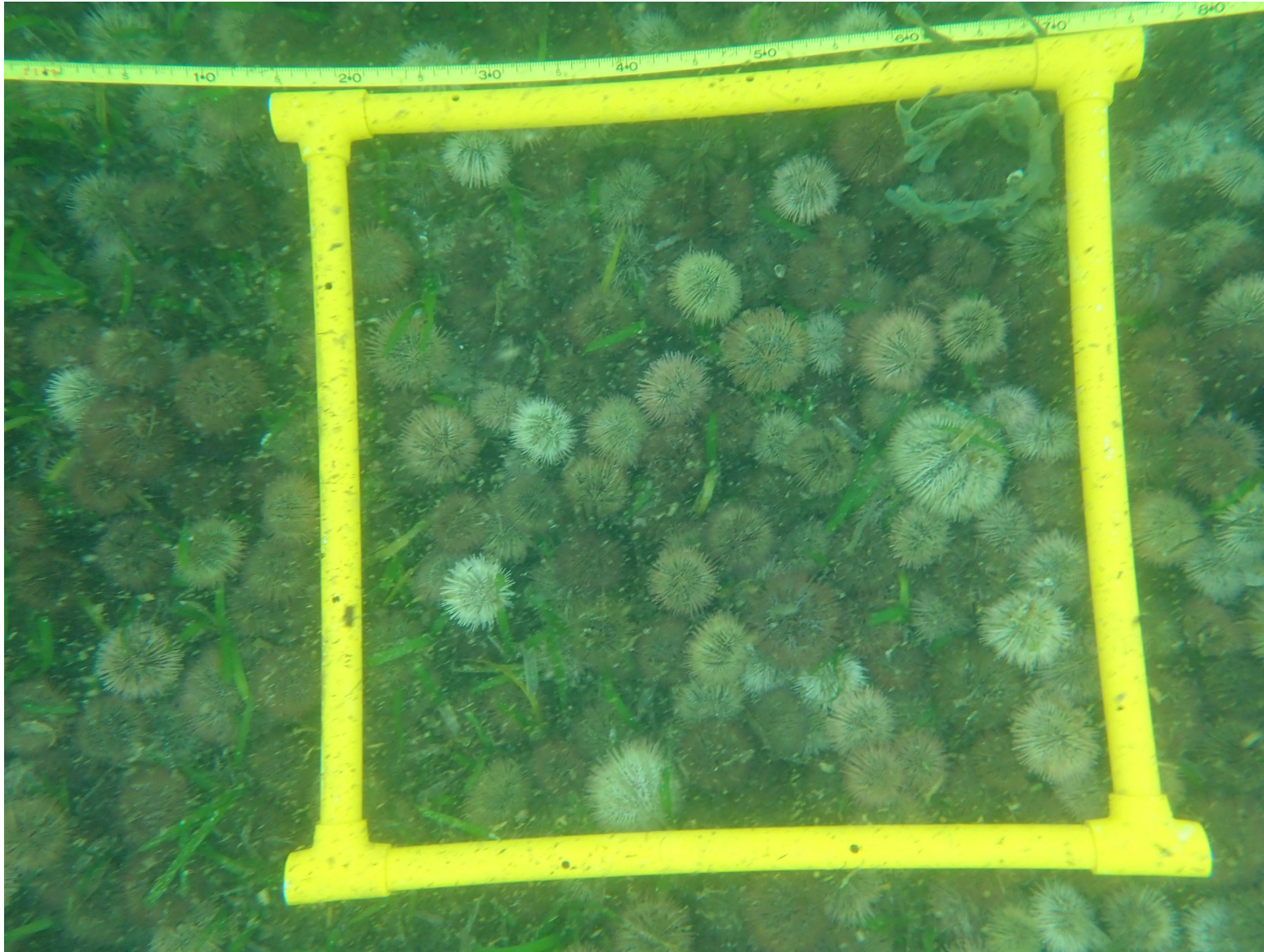
Total count	81
Mean diameter (mm)	63.28704
Minimum (mm)	48.77
Maximum (mm)	72.65
Standard Deviation	4.946865

Note: urchin diameter measured transversally, spine to spine at widest part

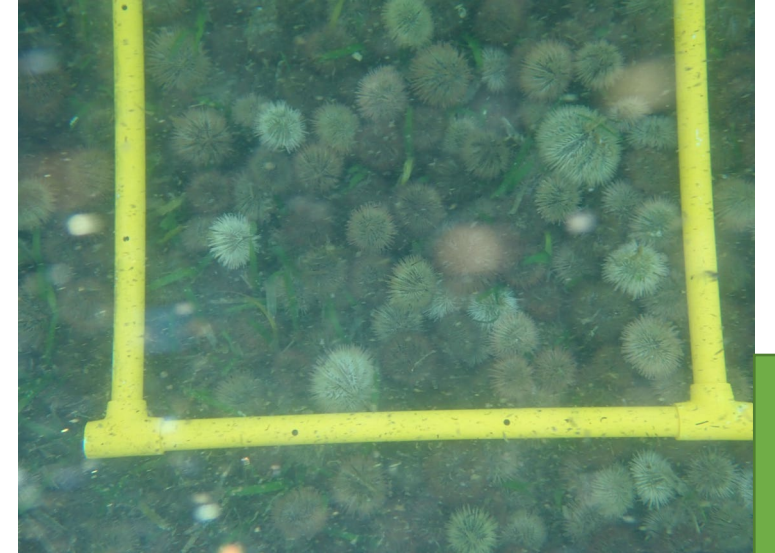
Urchin Survey Quad 2

USU2

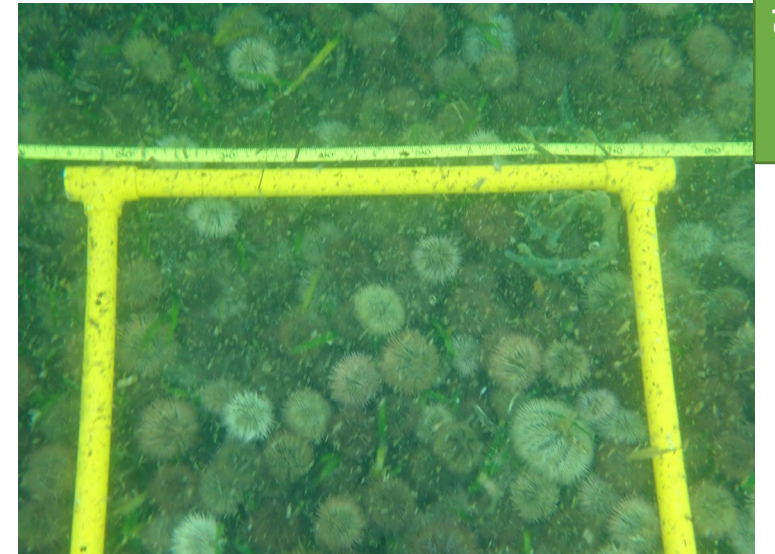
GPS: 29.8054, -83.6269



Full quad (0.25m²)



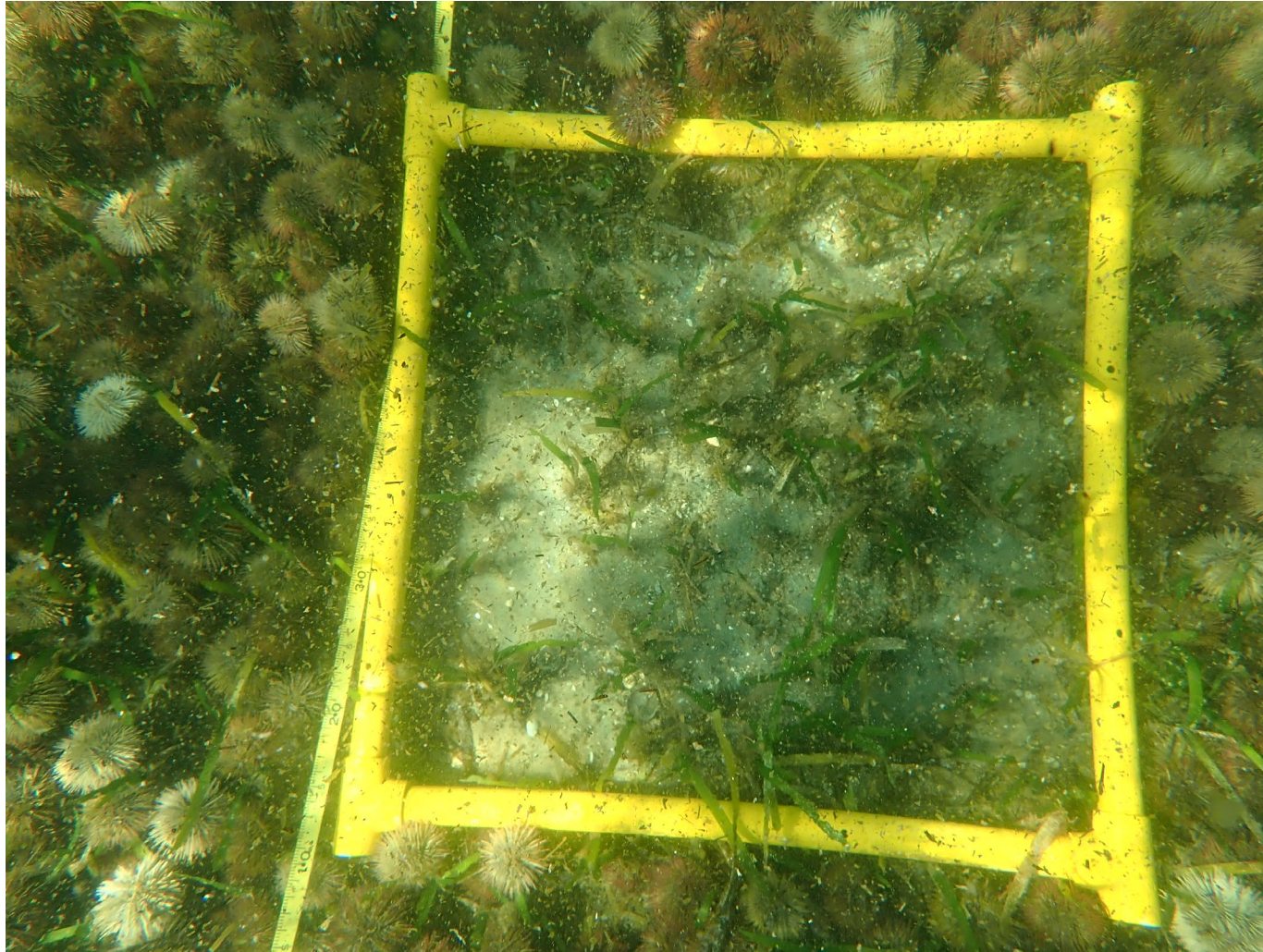
Closeup



Urchin Survey Quad 2

USU2

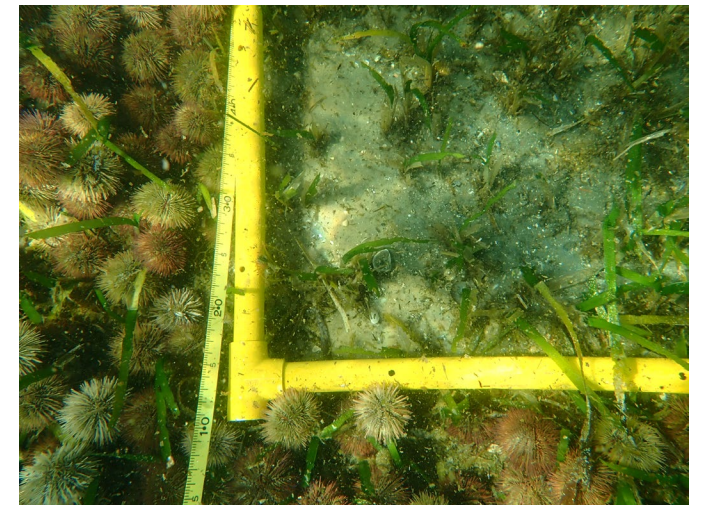
GPS: 29.8054, -83.6269



Full quad (0.25m²)

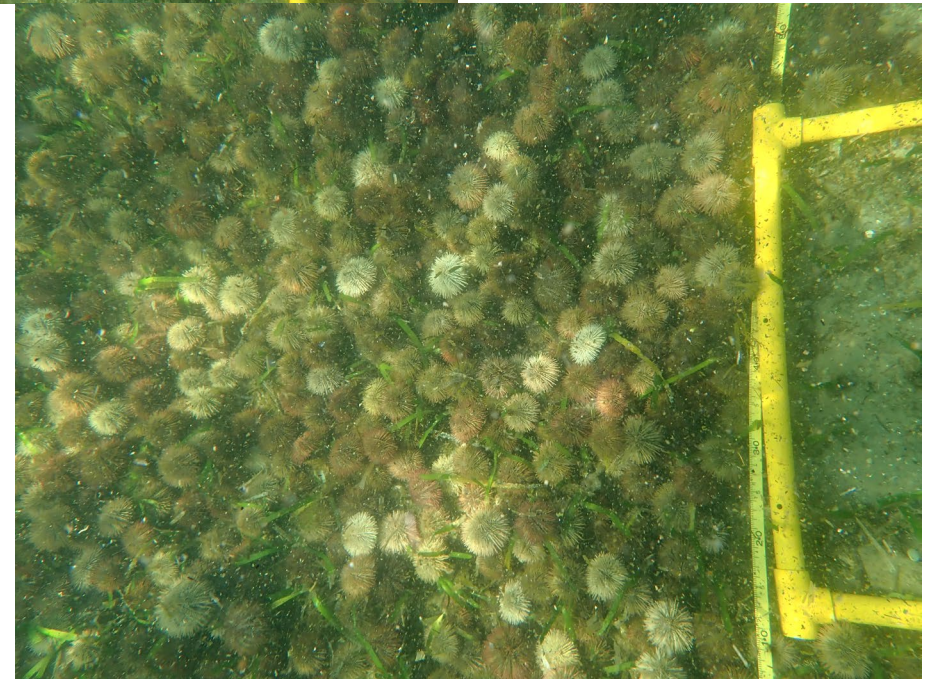
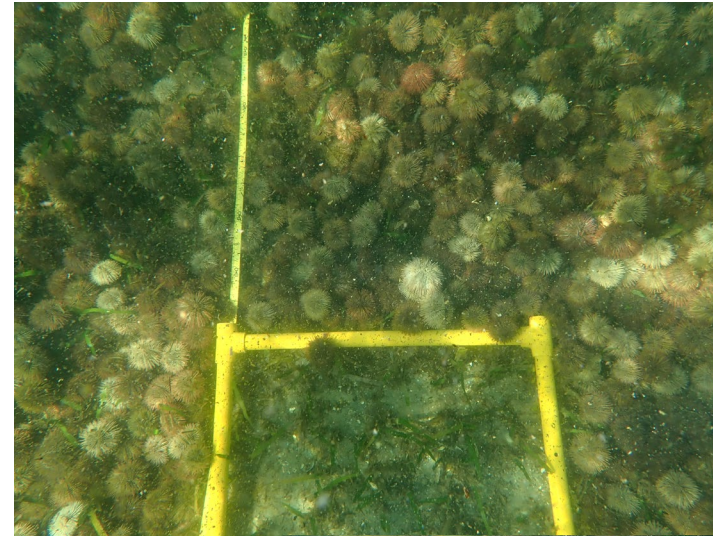
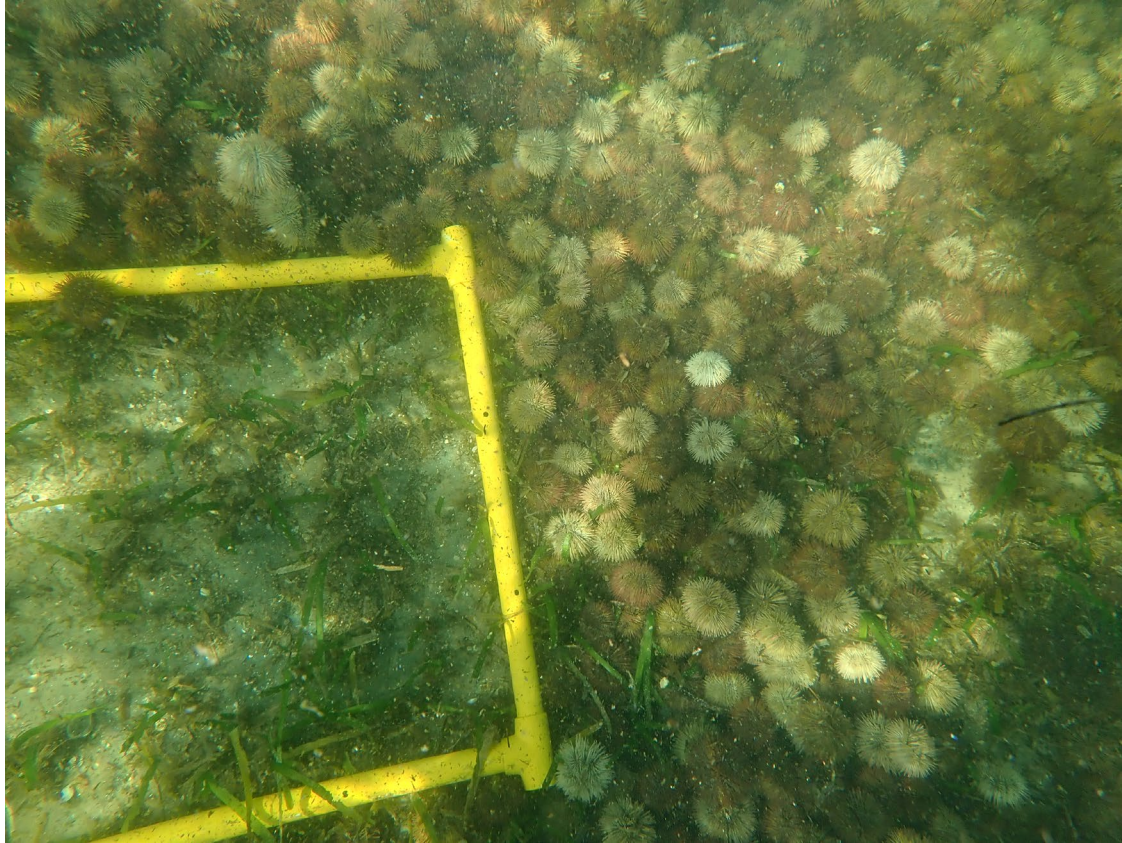


Closeup



Urchin Survey Quad 2

USU2
GPS: 29.8054, -83.6269



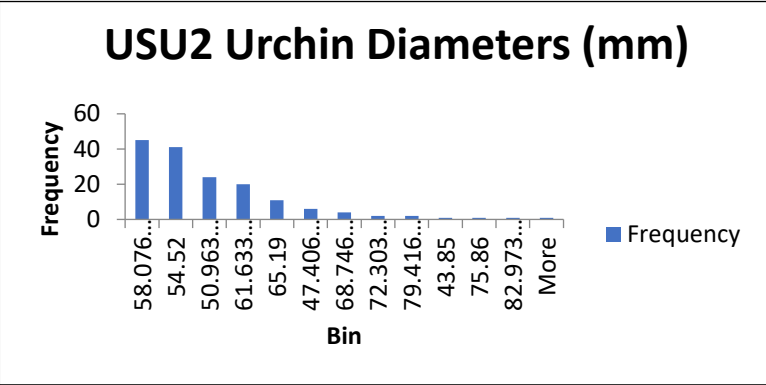
Urchin Survey Quad 2

USU2
GPS: 29.8054, -83.6269

TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
20	20	0	Light	Sand Mud Shell	Yes

SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)
TTES	20	9	12	9.6

Temp	DO (mg/L/)	Salinity	pH
17.2	7.65	33.33	7.98



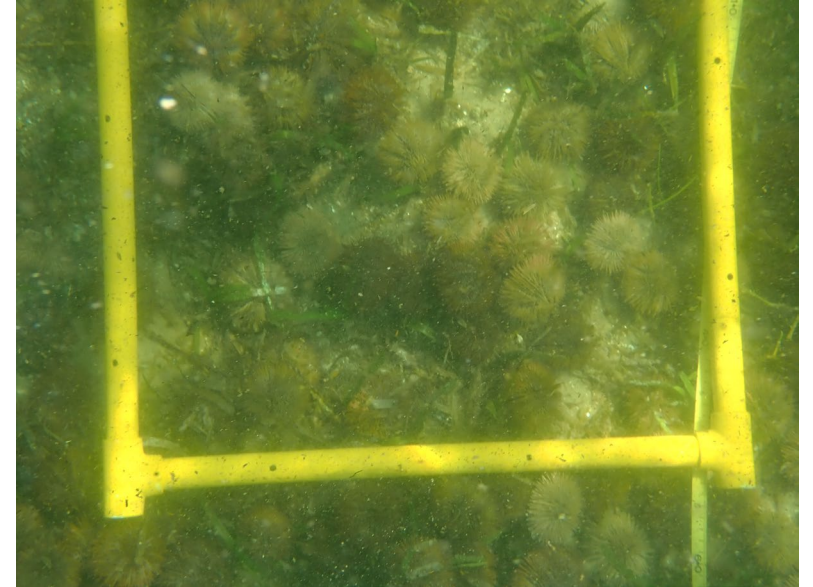
Urchin Survey Quad 3

USU3

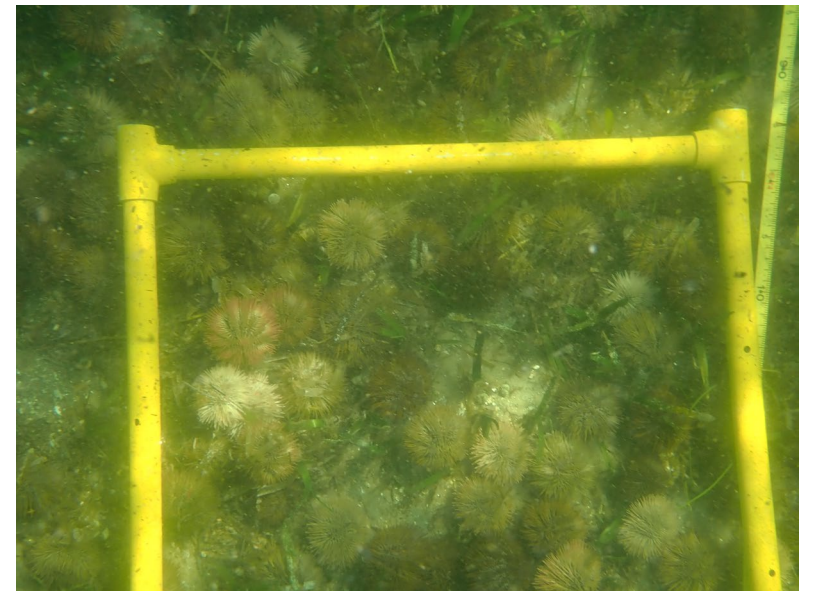
GPS: 29.805, -83.628



Full quad (0.25m²)



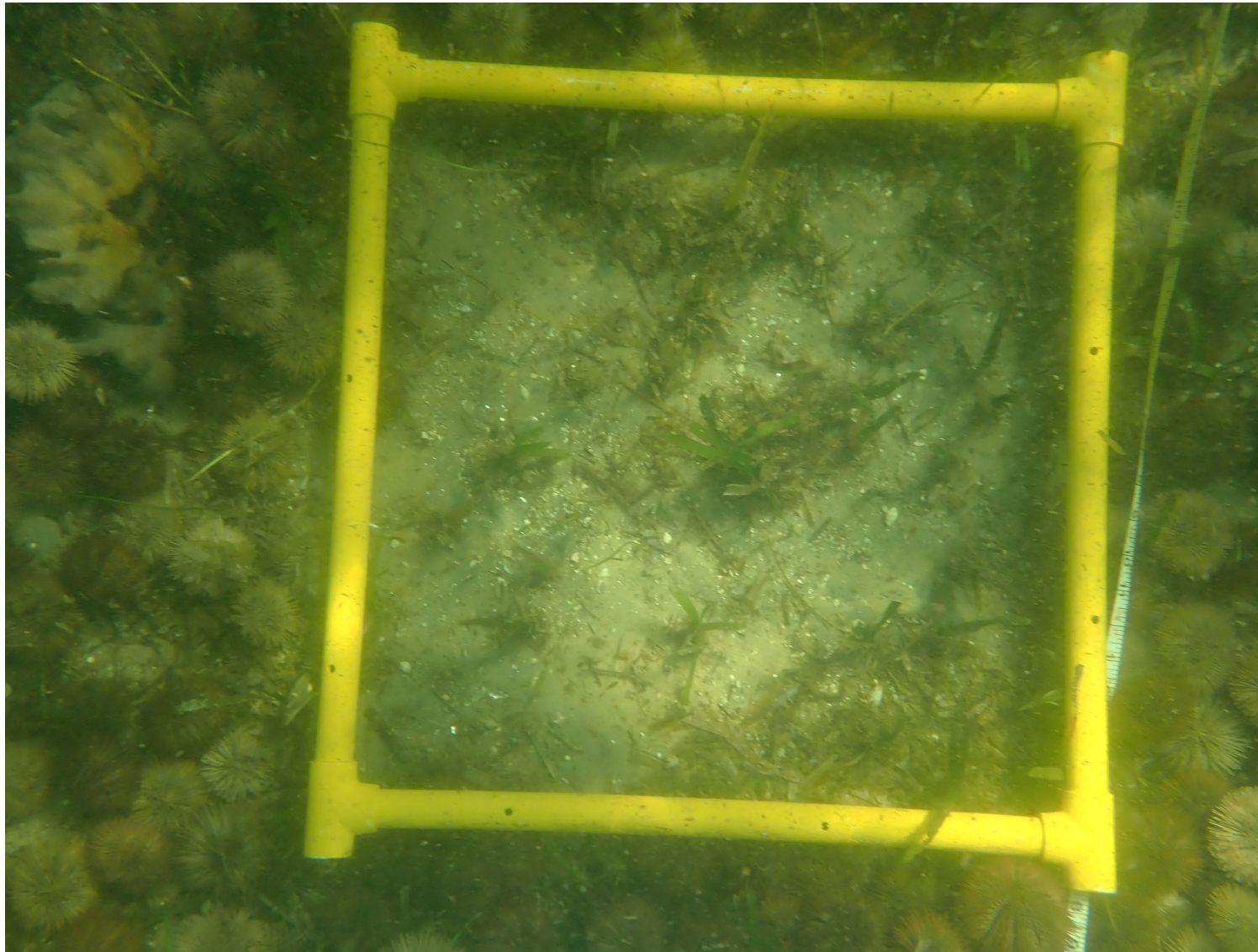
Closeup



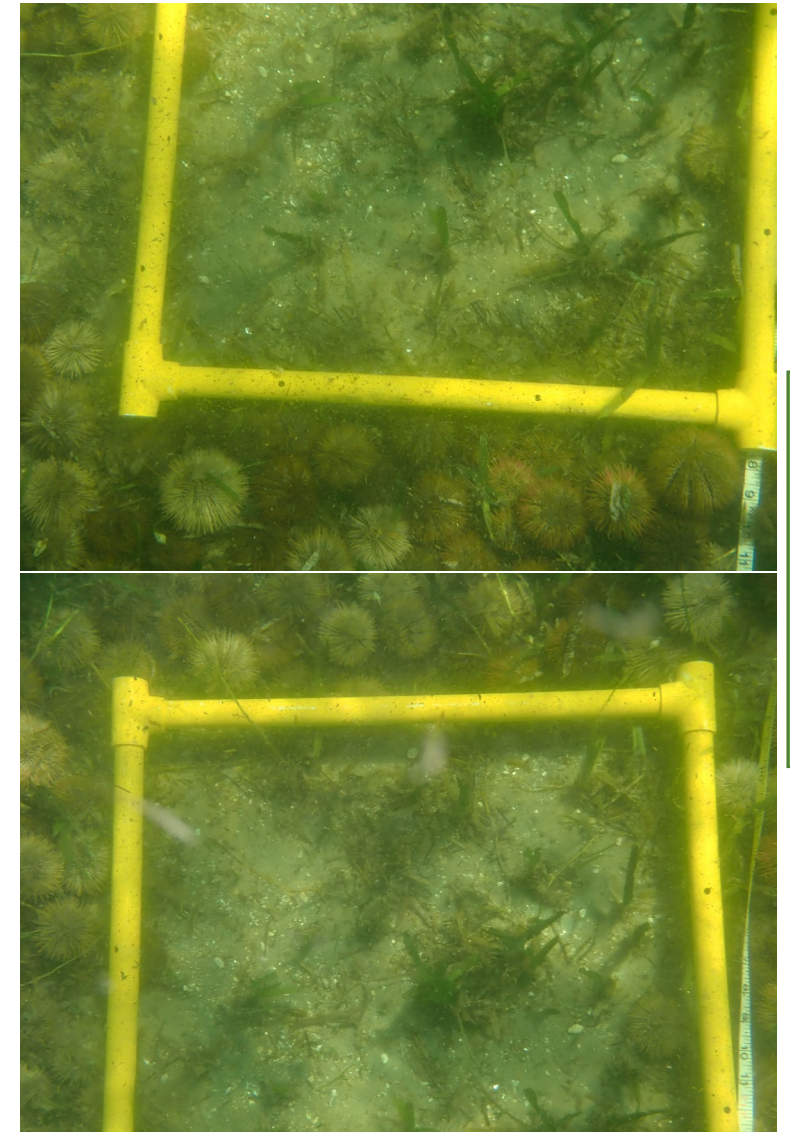
Urchin Survey Quad 3

USU3

GPS: 29.805, -83.628



Full quad (0.25m²)



Closeup

Urchin Survey Quad 3

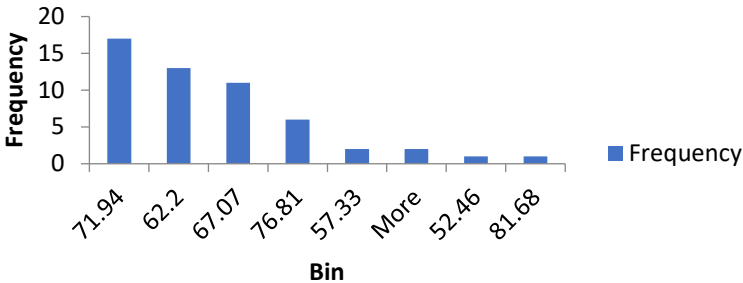
USU3
GPS: 29.805, -83.628

TOTAL_SAV_PERC	TOTAL_GRASS_PE	TOTAL_MACROAL	EPIPHYTE_DENSIT		
ENT_COVER	RCENT	GAE_PERCENT	Y	SEDIMENT_TYPE	Rhizomes
10	10	0	Light	Sand Mud Shell	Yes

		Canopy	Canopy	Canopy
SPECIES	PERCENT_COVER	Height (cm)	Height (cm)	Height (cm)
TTES	6	9	12.5	19.5

	DO		
Temp	(mg/L/)	Salinity	pH
17.3	7.7	33.11	7.98

USU2 Urchin Diameters (mm)

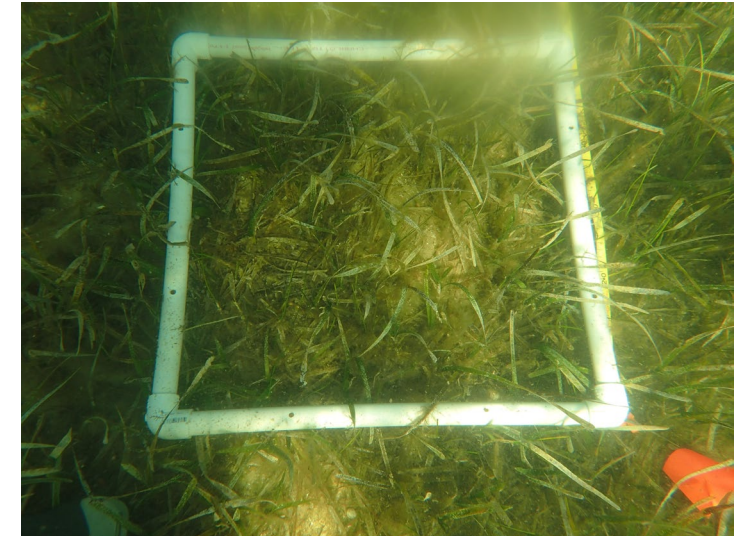
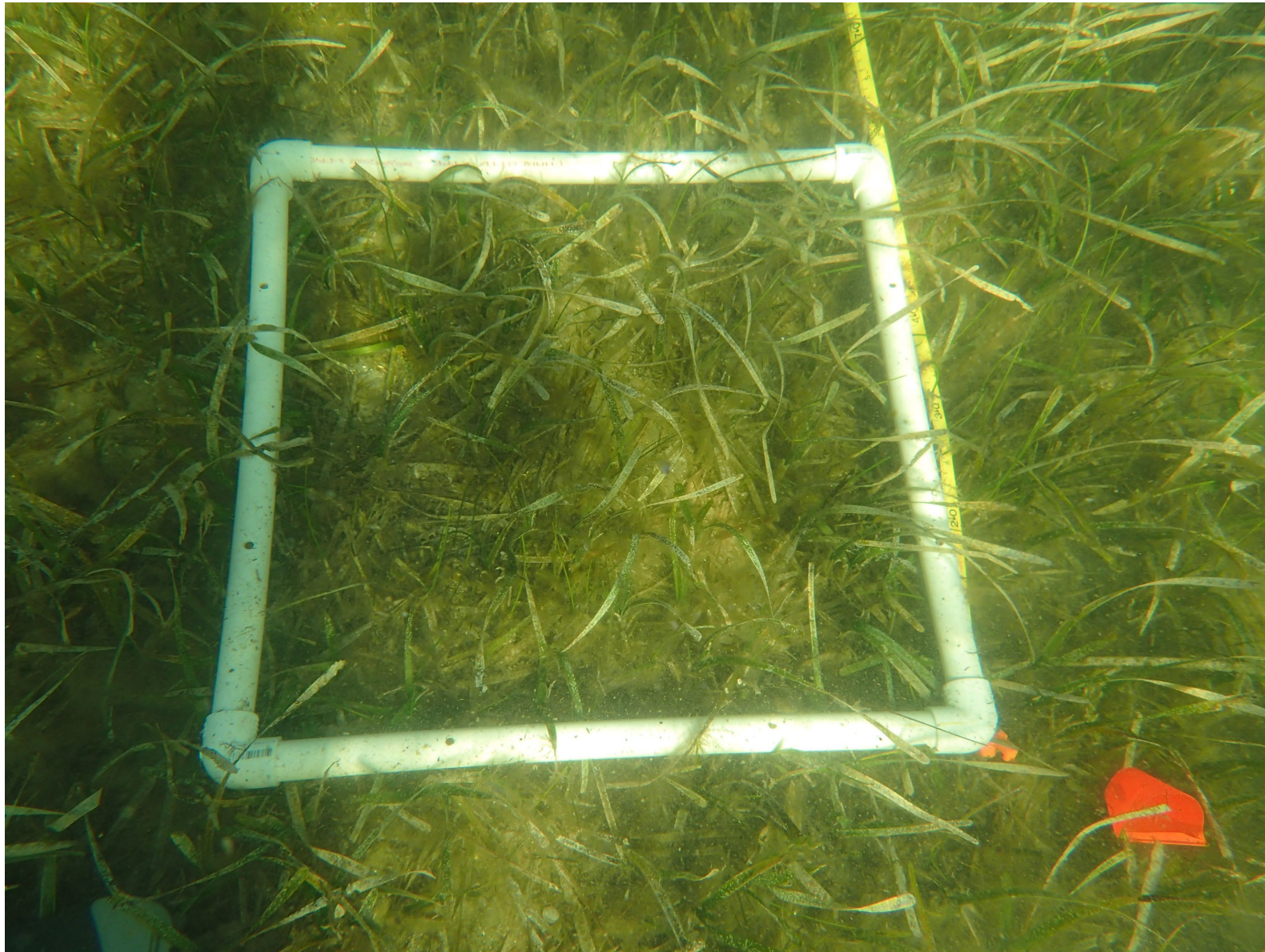


Total count	53
Mean diameter (mm)	66.64226
Minimum (mm)	52.46
Maximum (mm)	86.55
Standard Deviation	6.49137

Note: urchin diameter measured transversally, spine to spine at widest part

Urchin Survey Grass Quad

USG1:
GPS: 29.80811, -83.6241



Urchin Survey Grass Quad

USG1:
GPS: 29.80811, -83.6241

Data

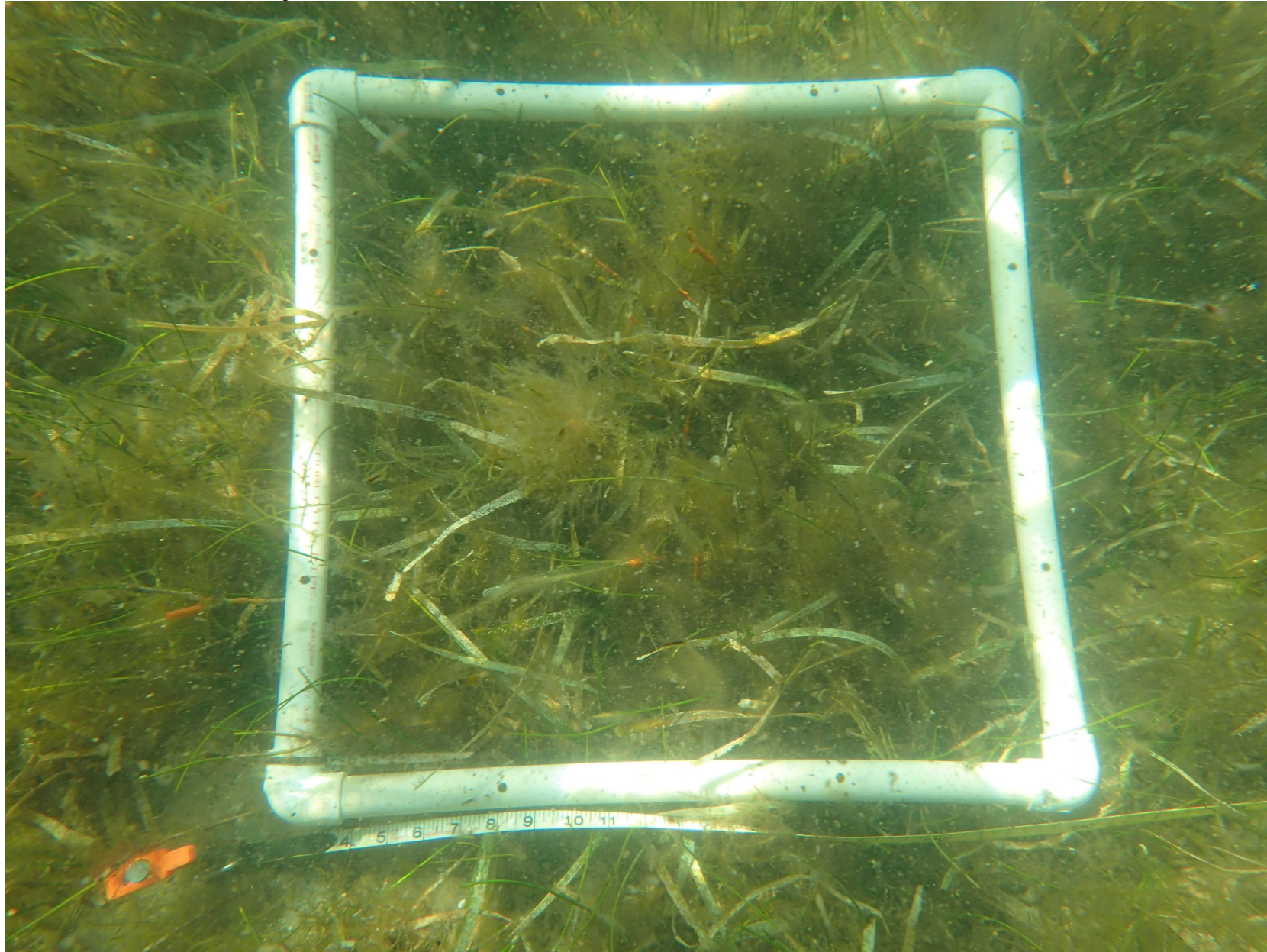
SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
TTES	27	26	21	18	2		0 Grass	37	37	0	Heavy	Sand Mud Shell	Yes
SFIL	8	23	22	11			Grass						
HWRI	2	25	21	16			Grass						

Temp	DO (mg/L/)	Salinity	pH
17.1	8.12	32.23	7.93

Urchin Survey Grass Quad

USG2:

GPS: 29.80543, -83.6268



Urchin Survey Grass Quad

USG2:
GPS: 29.80543, -83.6268

Data

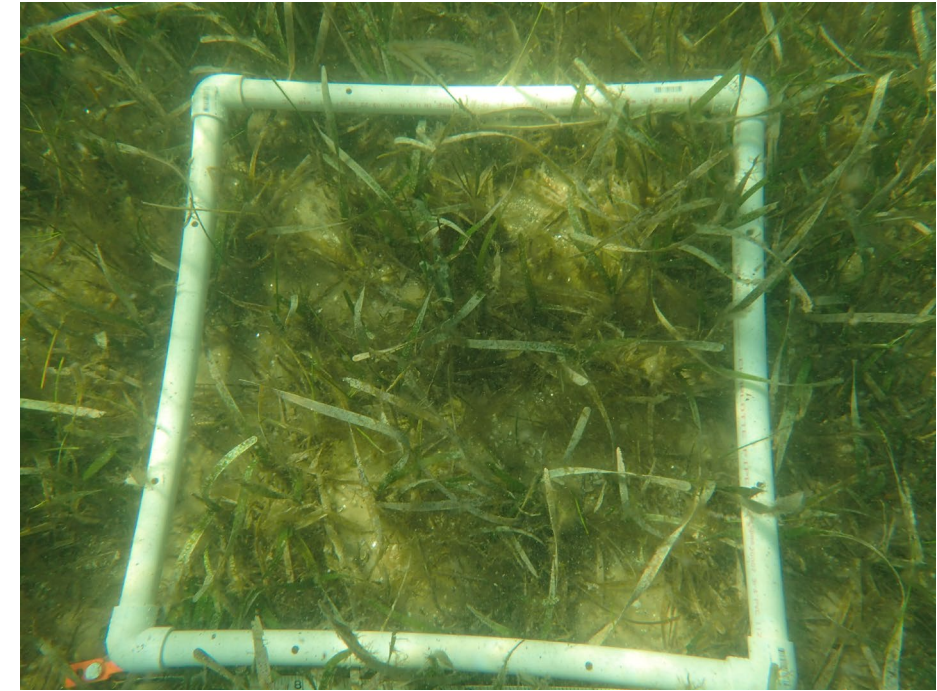
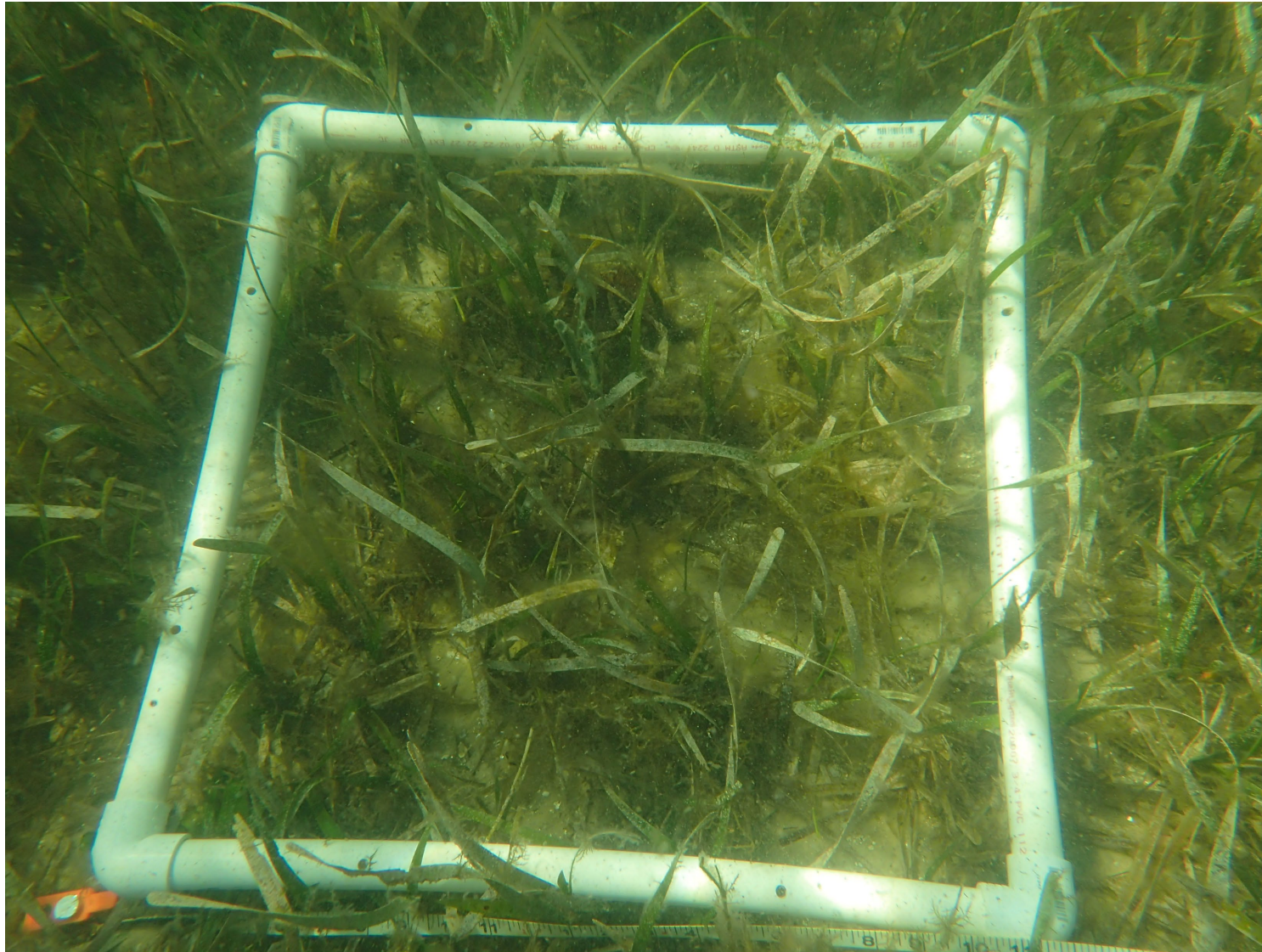
SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
TTES	15	12	17	25	0	0	Grass	33	32	1	Heavy	Sand Mud Shell	Yes
SFIL	15	16	20	26			Grass						
HINC	1						Algae						
HWRI	2	15	17	12			Grass						
Drift	60												

Temp	DO (mg/L/)	Salinity	pH
17.2	7.65	33.33	7.98

Urchin Survey Grass Quad

USG3

GPS: 29.80492, -83.6279



Urchin Survey Grass Quad

USG3
GPS: 29.80492, -83.6279

Data

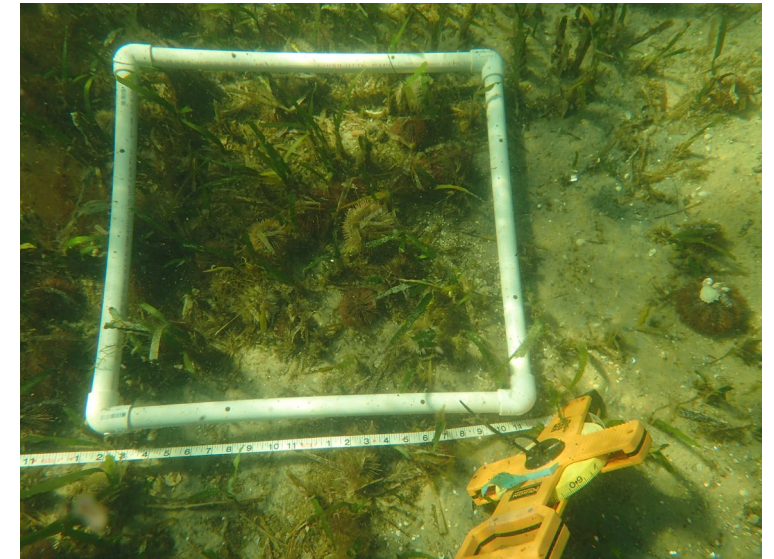
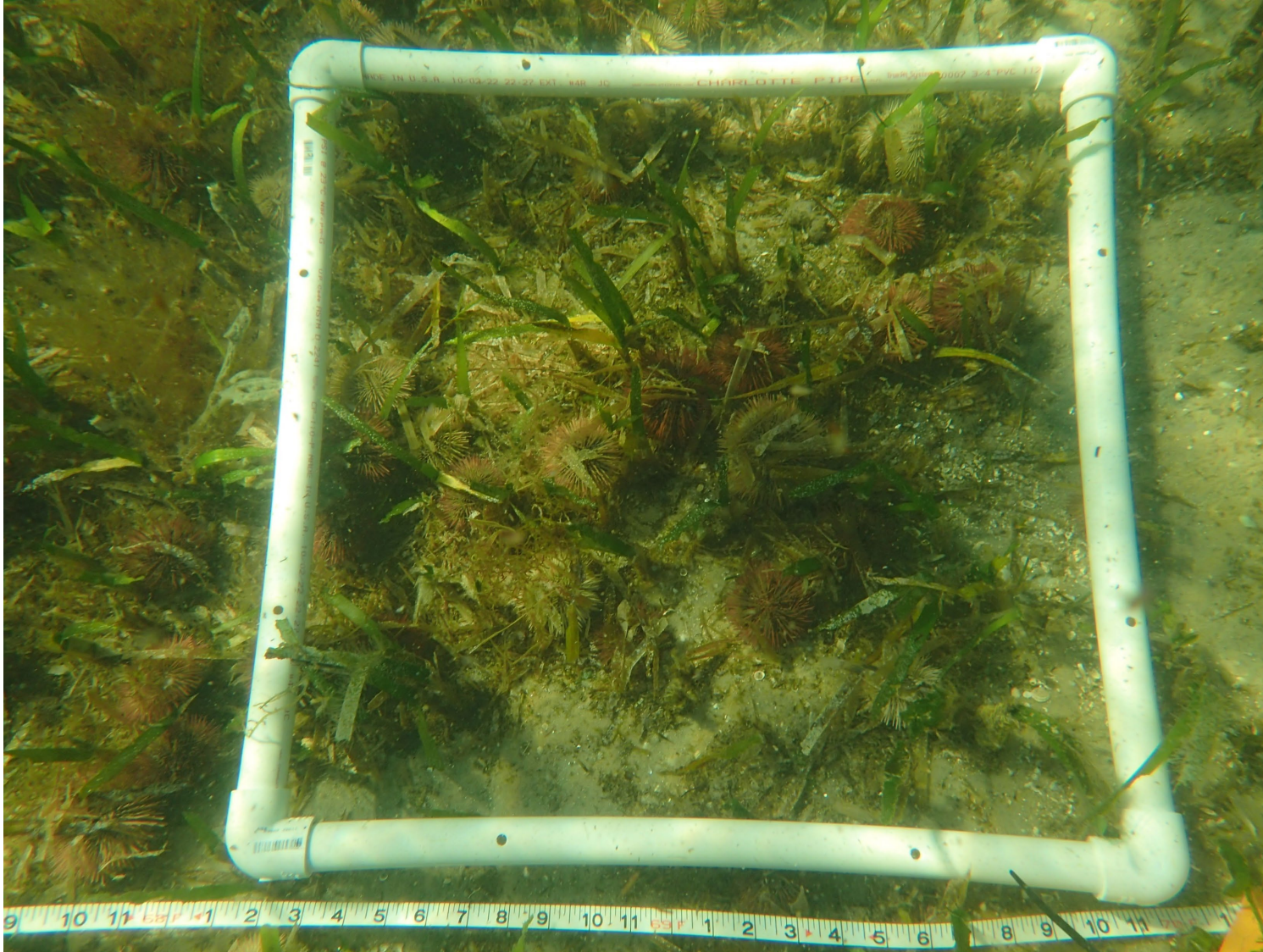
SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT	TOTAL_GROSS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
TTES	30	16	16	20	1		0 Grass	34	34	0	Heavy	Sand Mud Shell	Yes
SFIL	4	16	14	20			Grass						

Temp	DO (mg/L)	Salinity	pH
17.3	7.7	33.11	7.98

Urchin Survey Bare Quad

USB1

GPS: 29.80823, -83.6242



Urchin Survey Bare Quad

USB1
GPS: 29.80823, -83.6242

Data

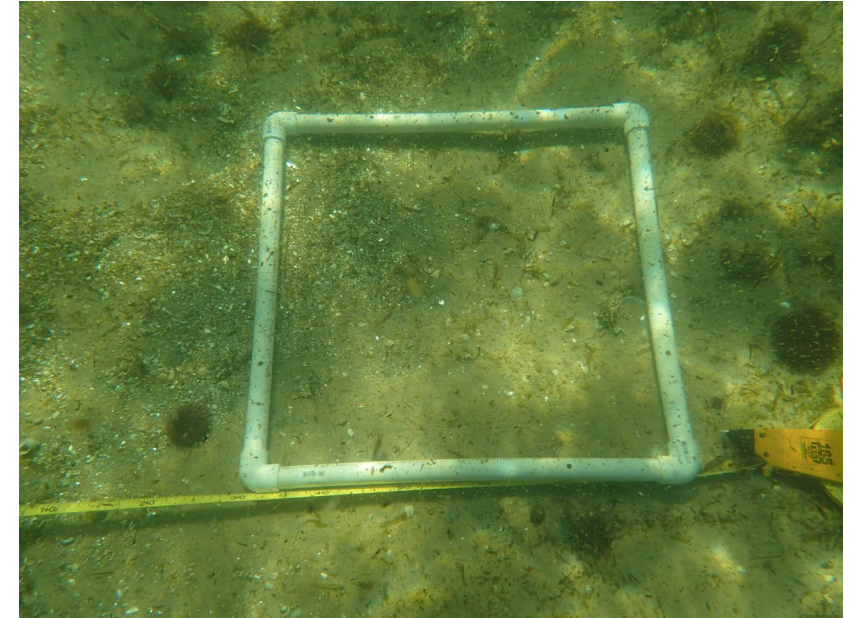
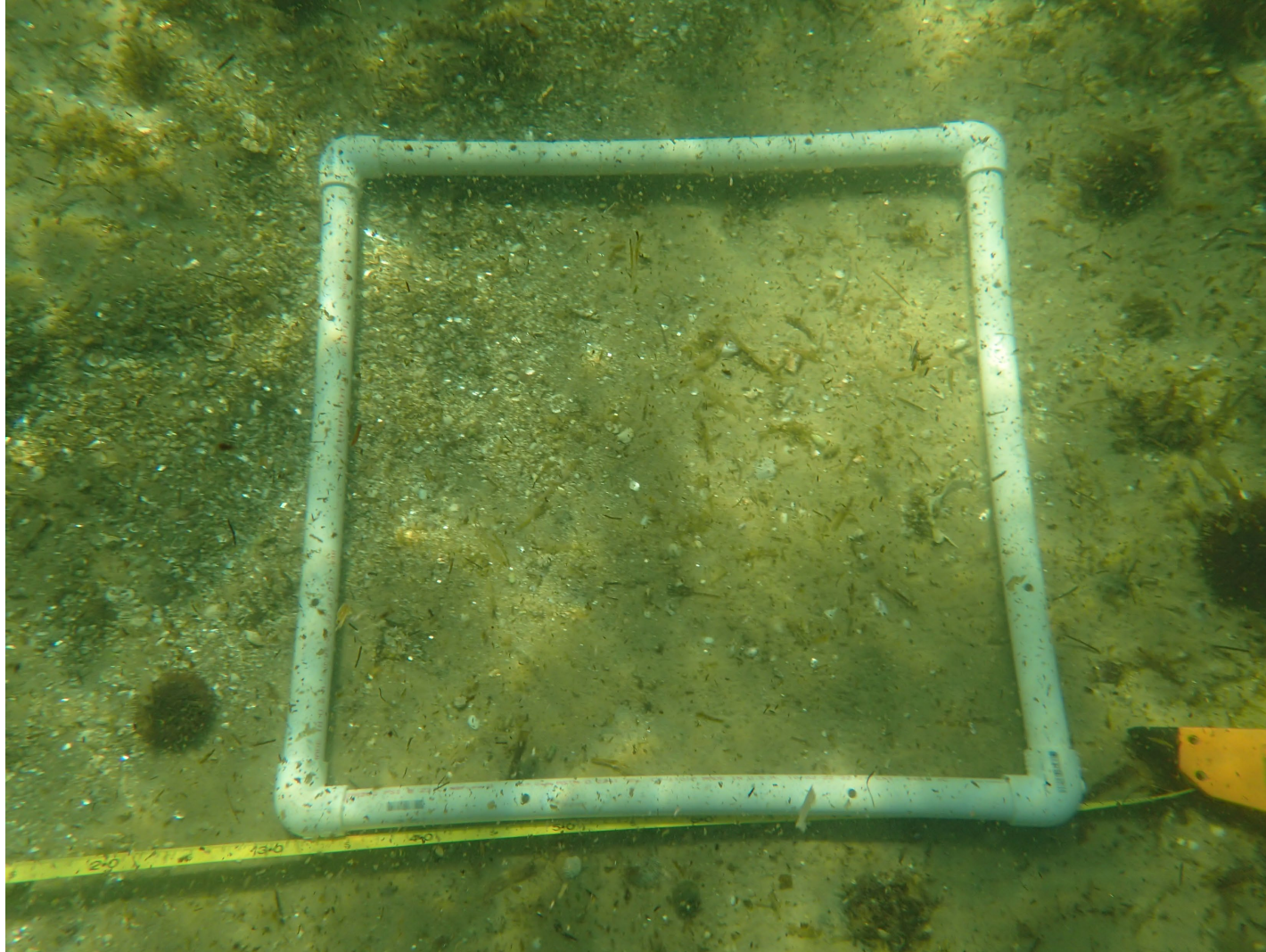
SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
TES	10	12	16	9	22	0	Grass	10	10	0	Heavy	Sand Mud Shell	Yes

Temp	DO (mg/L)	Salinity	pH
17.1	8.12	32.23	7.93

Urchin Survey Bare Quad

USB2

GPS: 29.80543, -83.627



Urchin Survey Bare Quad

USB2
GPS: 29.80543, -83.627

Data

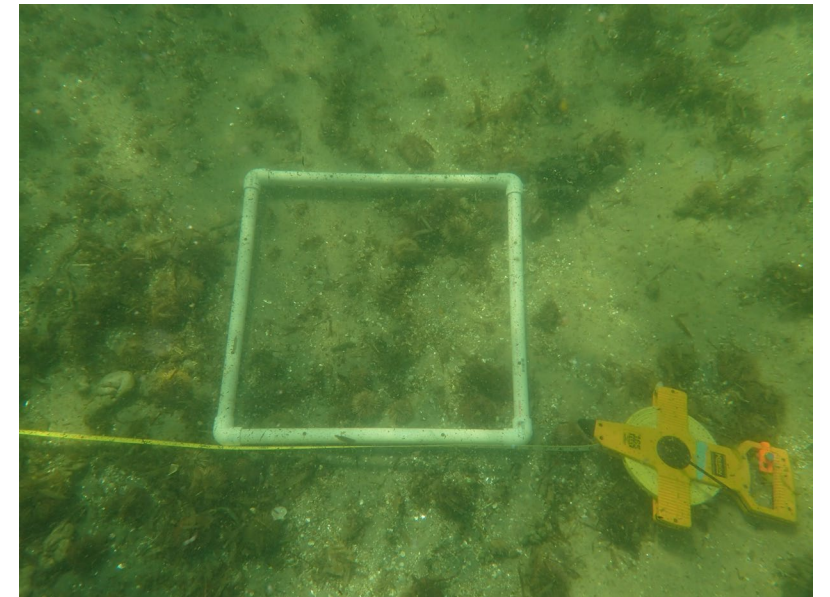
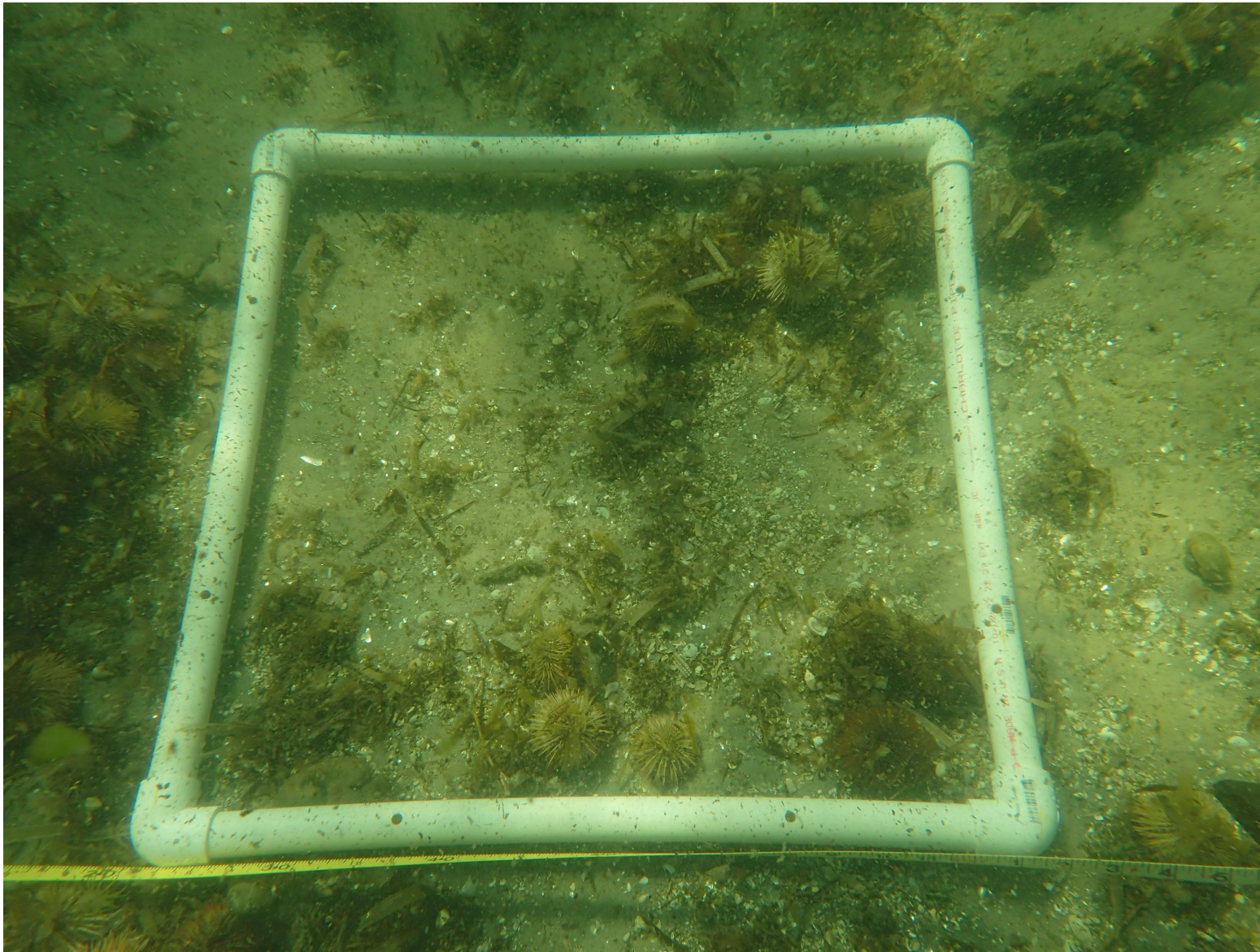
SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT_COVER	TOTAL_GRASS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
None	0				0	0		0	0	0			Yes

Temp	DO (mg/L/)	Salinity	pH
17.2	7.65	33.33	7.98

Urchin Survey Bare Quad

USB3

GPS: 29.80501, -83.628



Urchin Survey Bare Quad

USB3
GPS: 29.80501, -83.628

Data

SPECIES	PERCENT_COVER	Canopy Height (cm)	Canopy Height (cm)	Canopy Height (cm)	URCHINS	SCALLOPS	GRASS_ALGAE	TOTAL_SAV_PERCENT	TOTAL_GROSS_PERCENT	TOTAL_MACROALGAE_PERCENT	EPIPHYTE_DENSITY	SEDIMENT_TYPE	Rhizomes
None	0				11	0		0	0	0			Yes

Temp	DO (mg/L)	Salinity	pH
17.3	7.7	33.11	7.98

Density averages by type of quad

Type	avg % total sav	average % grass	average urchin count	average BB score
Bare	3.333333	3.333333	11	1
Grass	34.66667	34.33333	1	3
Urchin	20	20	97.66667	2

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. Analysis of established sites in following slides.

Average canopy height

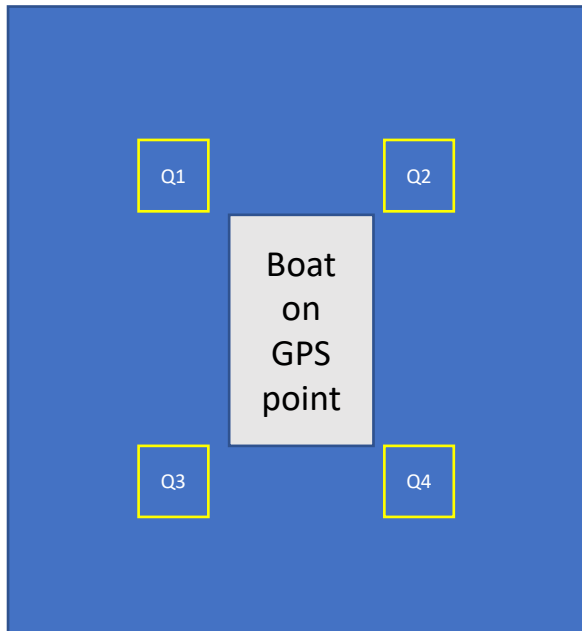
Site Name	Type	SPECIES	avg canopy
USU01	Urchin	TTES	14.93333
USU01	Urchin	SFIL	19
USU02	Urchin	TTES	10.2
USU03	Urchin	TTES	13.66667
USU03	Urchin	SFIL	8.066667
USB01	Bare	TTES	12.33333
USG01	Grass	TTES	21.66667
USG01	Grass	SFIL	18.66667
USG01	Grass	HWRI	20.66667
USG02	Grass	TTES	18
USG02	Grass	SFIL	20.66667
USG02	Grass	HWRI	14.66667
USG03	Grass	TTES	17.33333
USG03	Grass	SFIL	16.66667

Average canopy height of TTES by type

type	average TTES Height
Urchin	12.93333
Grass	19
Bare	12.33333

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.

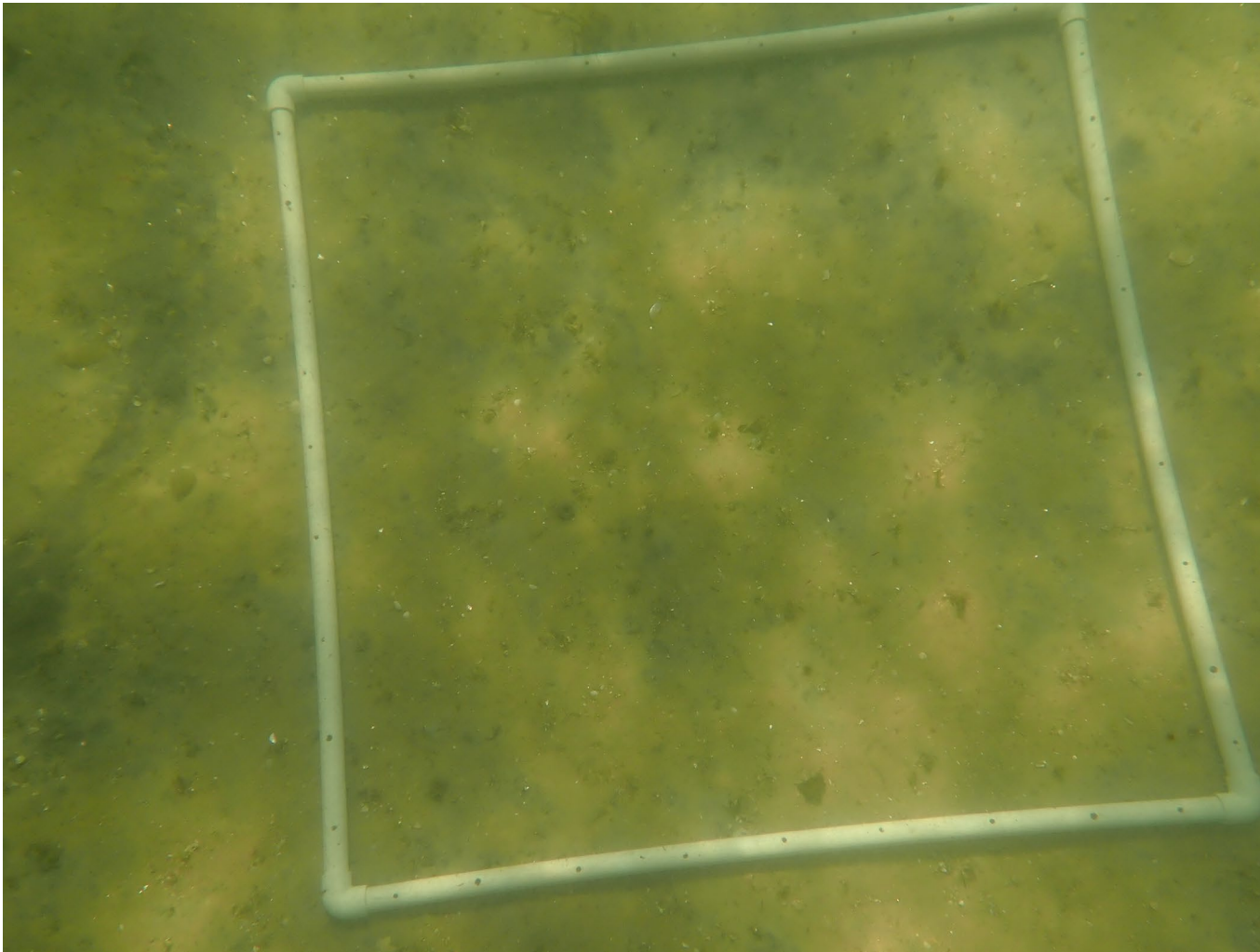


Urchin Survey DBKB14 Quad 1

DBKB14 GPS:

Latitude 29.8067

Longitude -83.6311



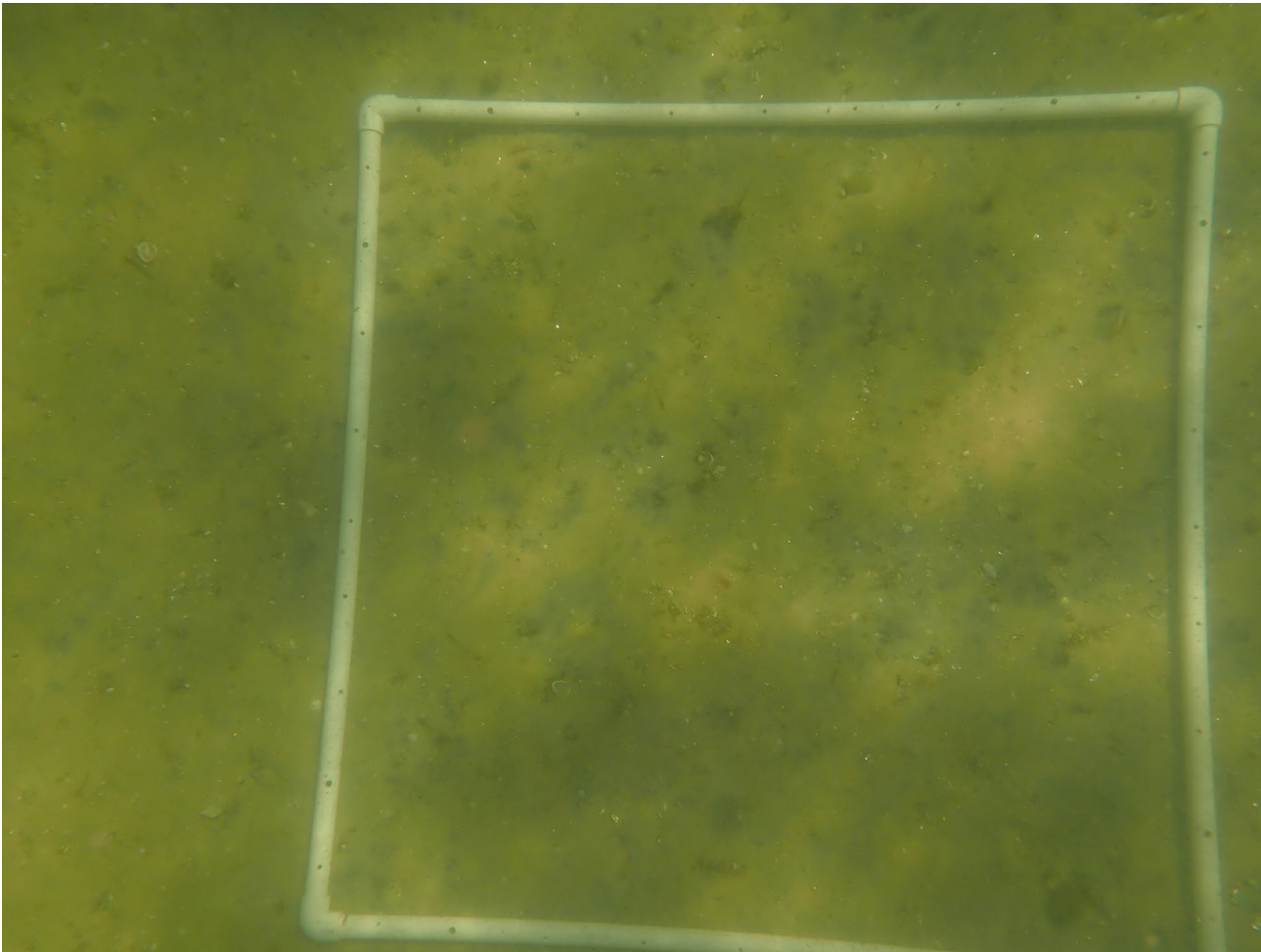
No urchins present,
one urchin test in
quad.



Urchin Survey DBKB14 Quad 2

DBKB14 GPS:

Latitude 29.8067
Longitude -83.6311



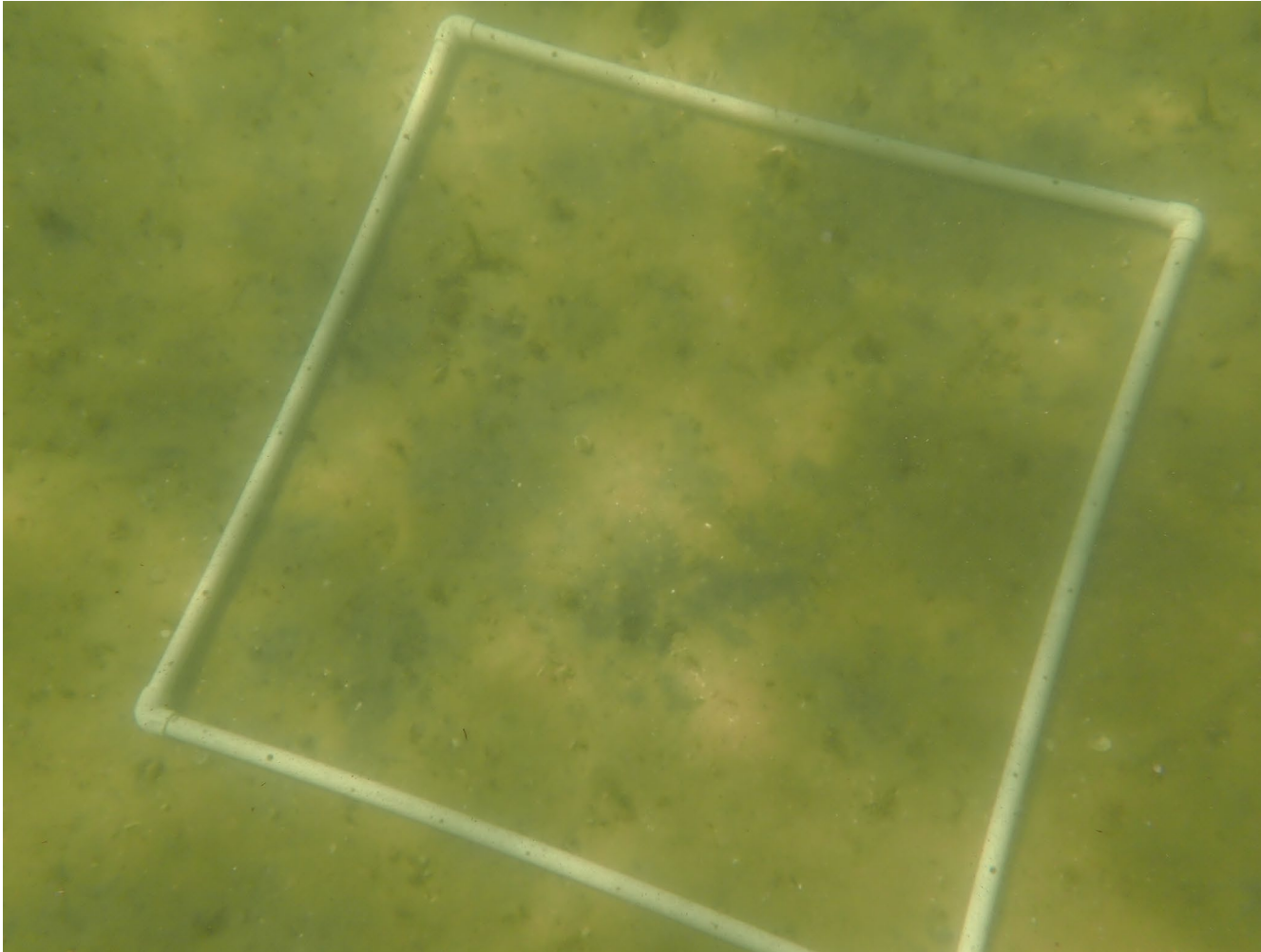
No urchins present

Urchin Survey DBKB14 Quad 3

DBKB14 GPS:

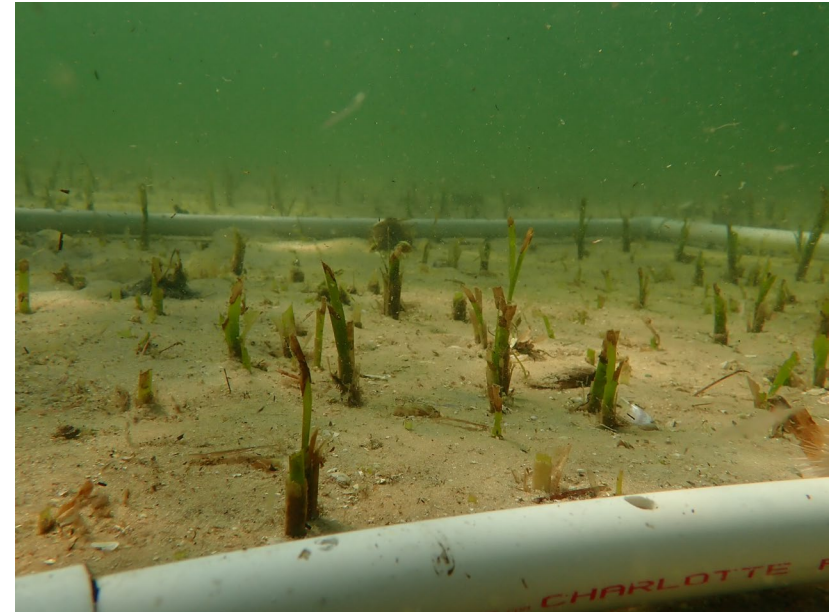
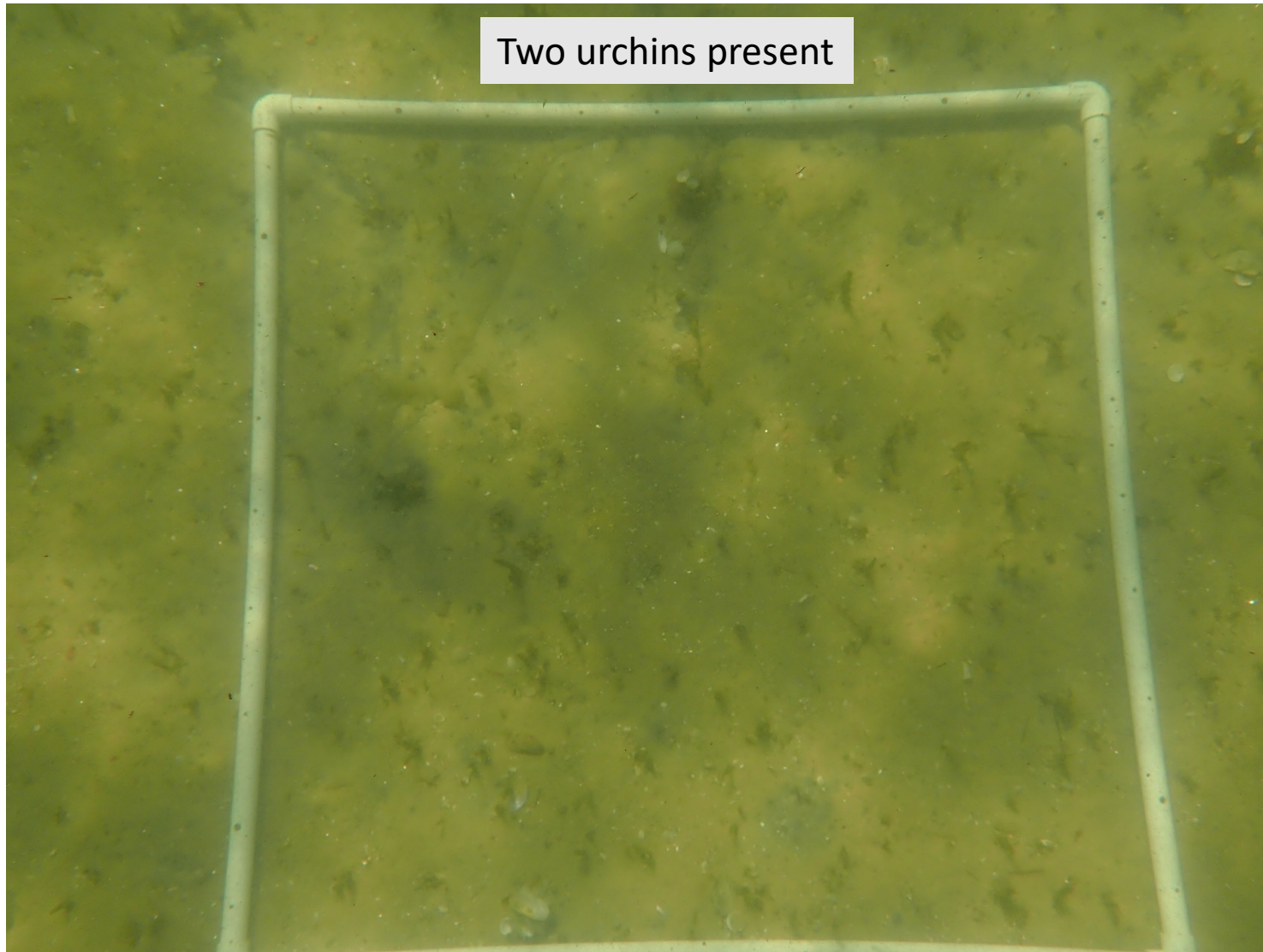
Latitude	29.8067
Longitude	-83.6311

No urchins present



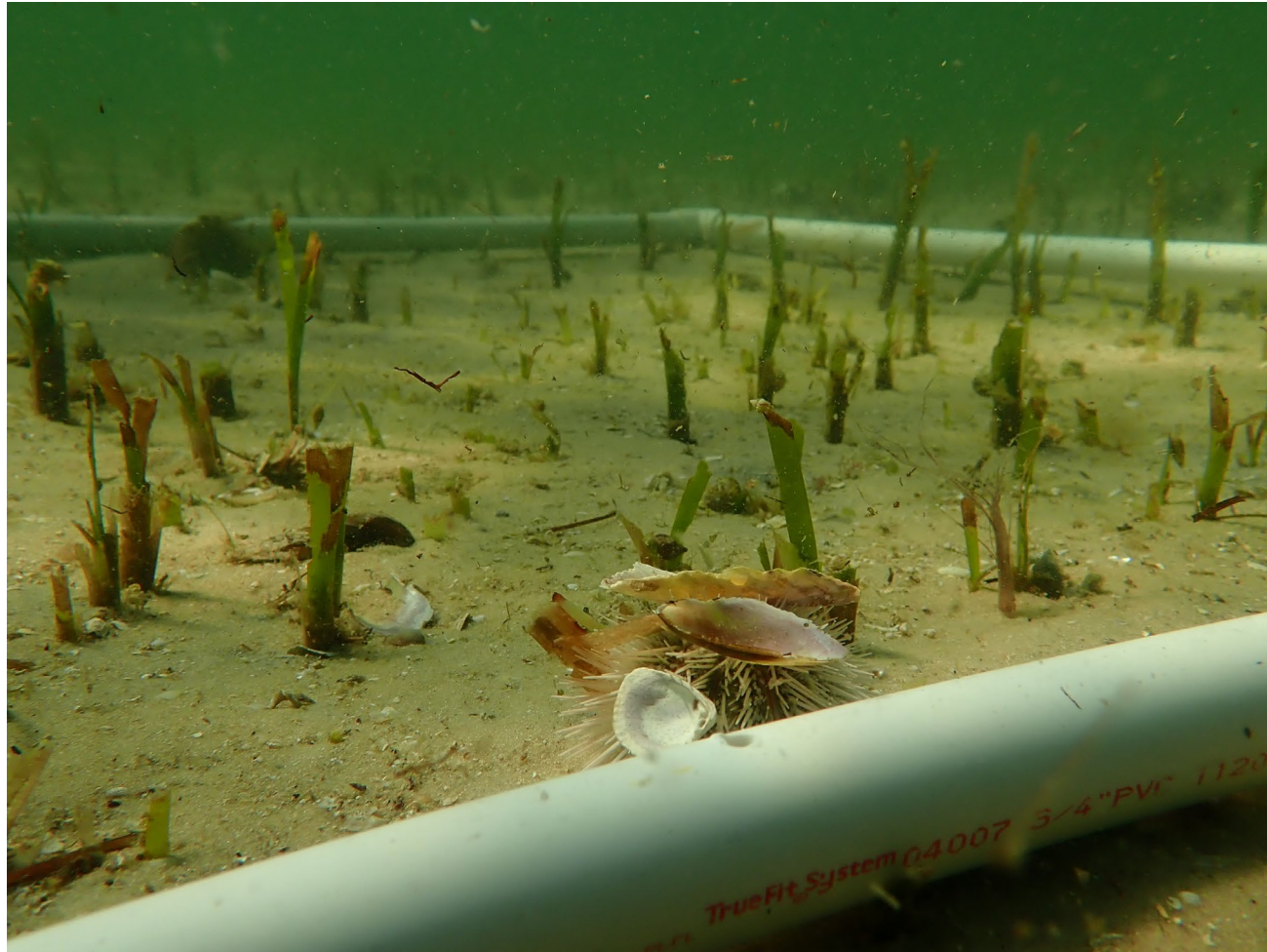
Urchin Survey DBKB14 Quad 4

DBKB14 GPS: Latitude 29.8067
Longitude -83.6311



Urchin Survey DBKB14 Quad 4 cont.

DBKB14 GPS: Latitude 29.8067
Longitude -83.6311

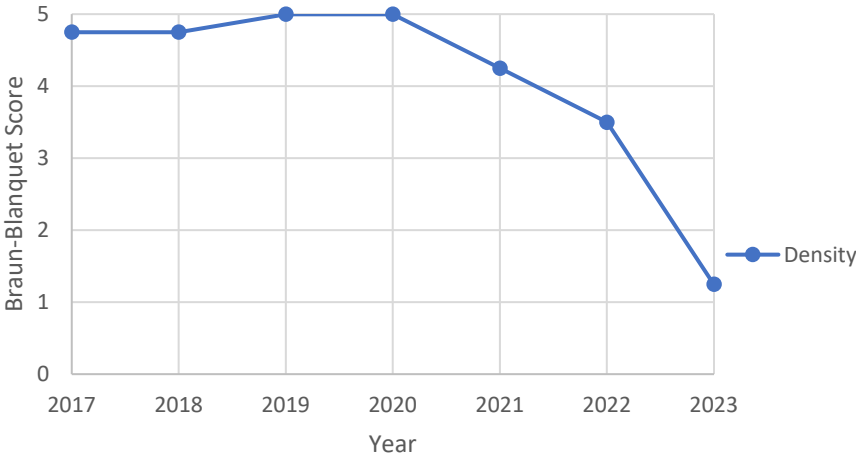


Two urchins present

Urchin Survey DBKB14 Visit

DBKB14 GPS: Latitude 29.8067
Longitude -83.6311

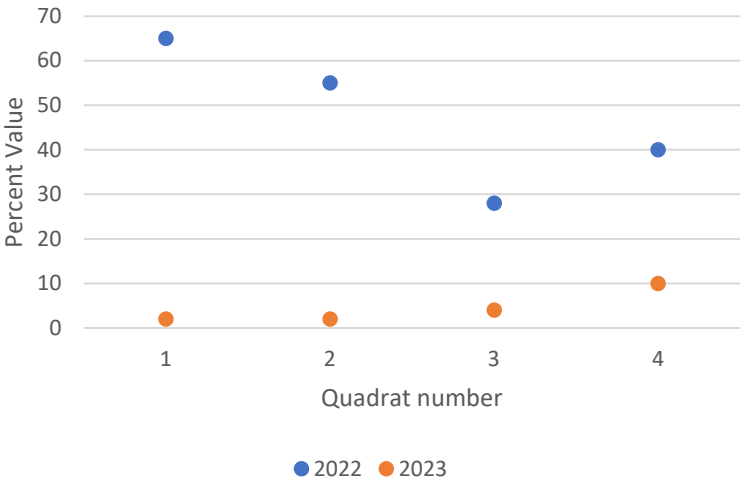
DBKB14 Total Seagrass Density



Braun-Blanquet Scores	2017	2018	2019	2020	2021	2022	2023
Quad 1	5	5	5	5	4	4	1
Quad 2	5	5	5	5	5	4	1
Quad 3	4	4	5	5	4	3	1
Quad 4	5	5	5	5	4	3	2

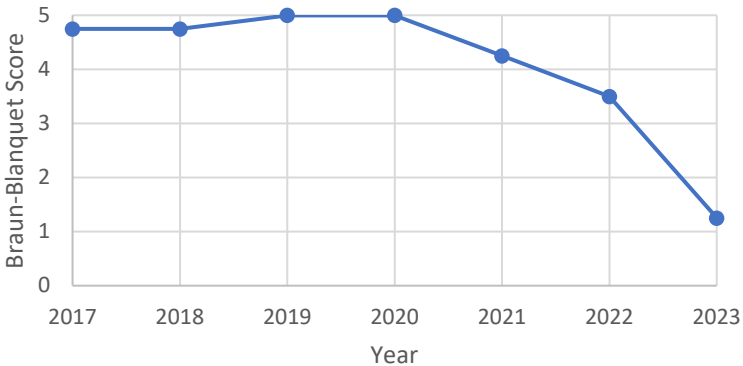
Year	Density (sum BB)/4
2017	4.75
2018	4.75
2019	5
2020	5
2021	4.25
2022	3.5
2023	1.25

DBKB14 Quad Percent Cover in 2022 and 2023



Percent Cover	2022	2023
Quad 1	65	2
Quad 2	55	2
Quad 3	28	4
Quad 4	40	10

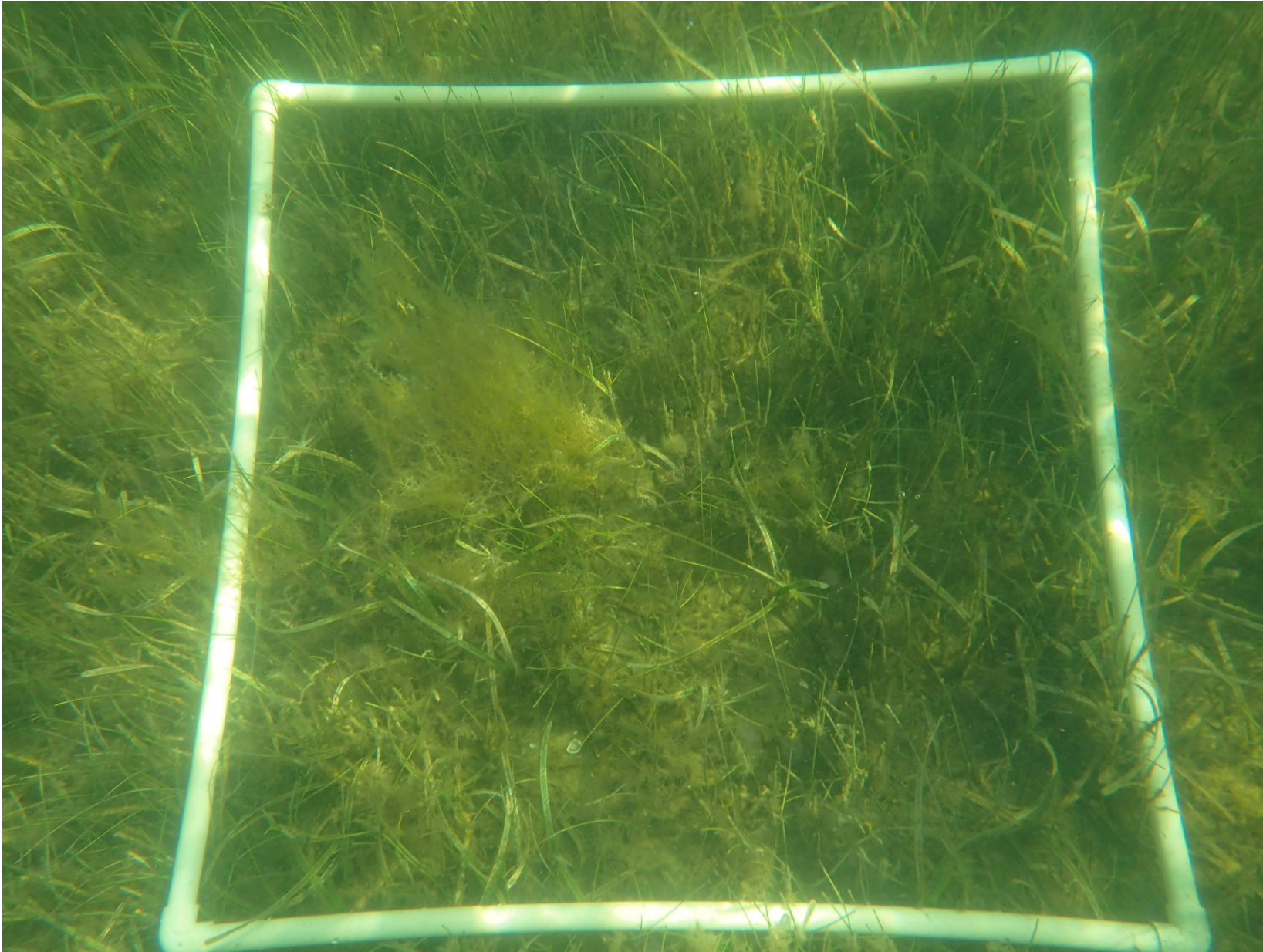
DBKB14 TTES Density



Urchin Survey DBKB15 Quad 1

DBKB15 GPS:

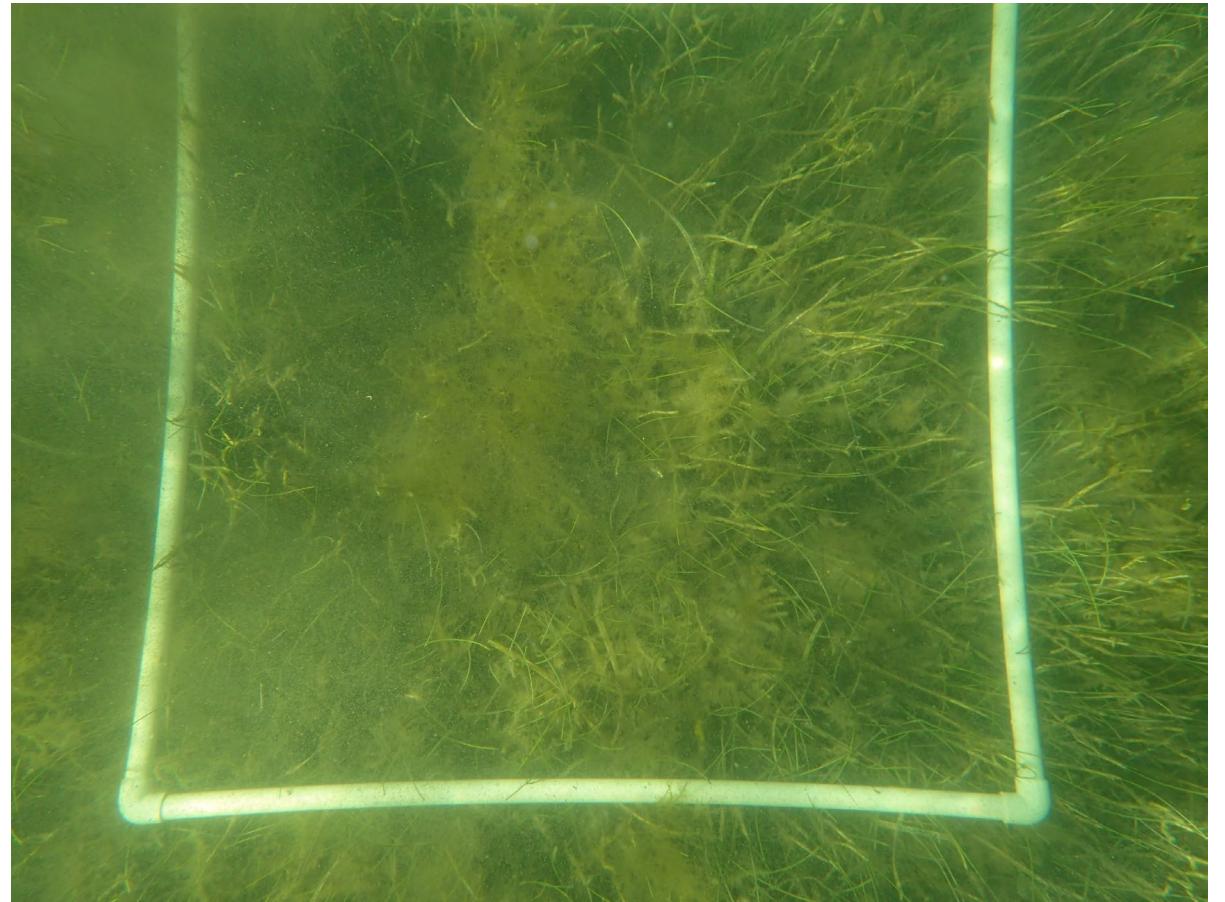
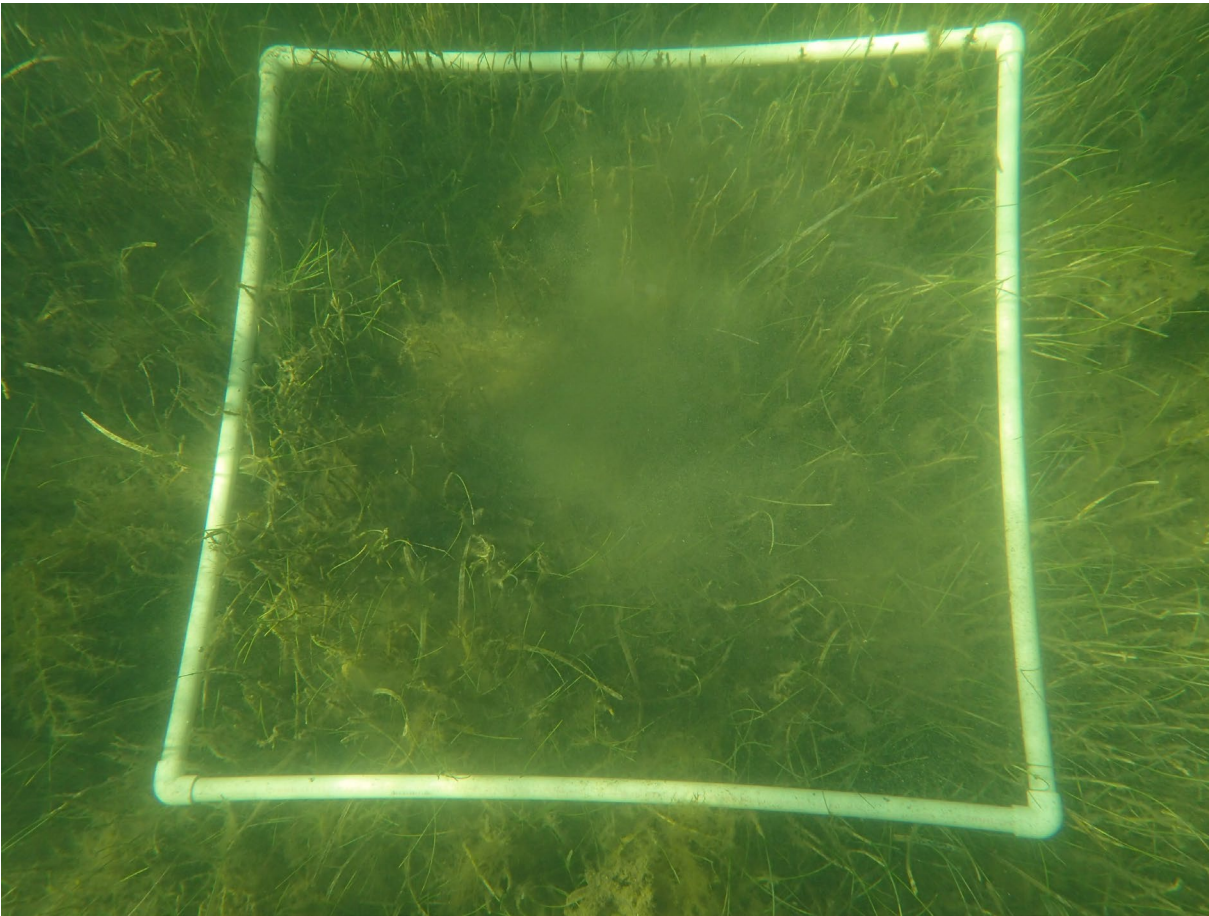
Latitude	29.8015
Longitude	-83.6171



No urchins present

Urchin Survey DBKB15 Quad 2

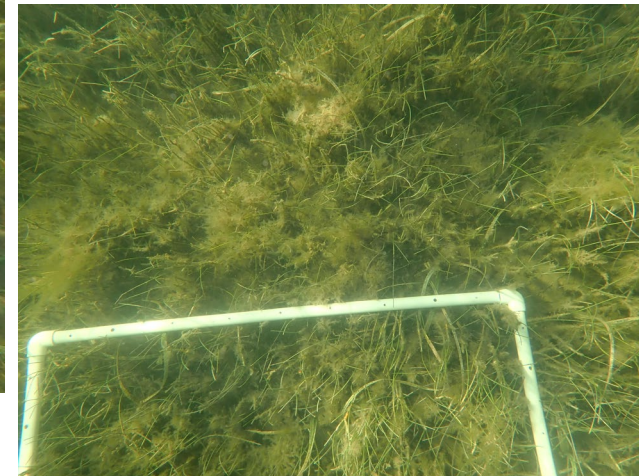
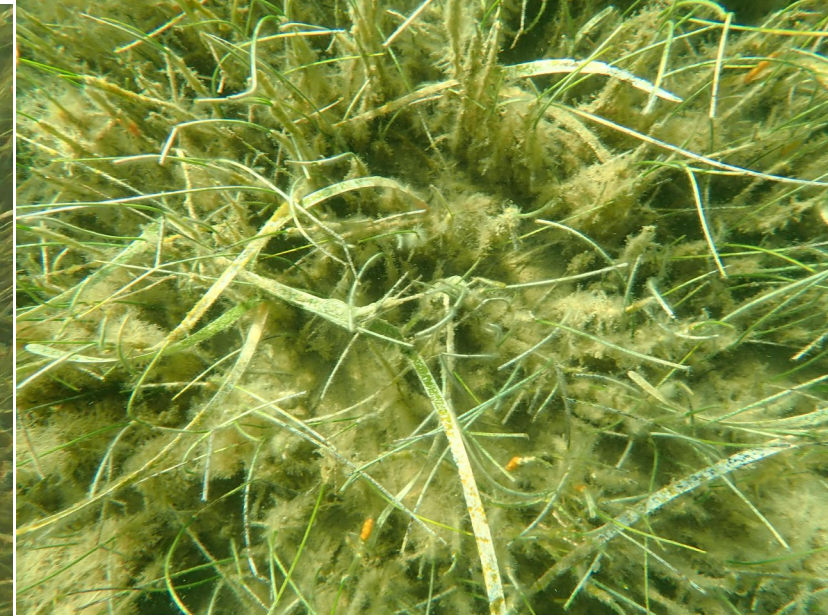
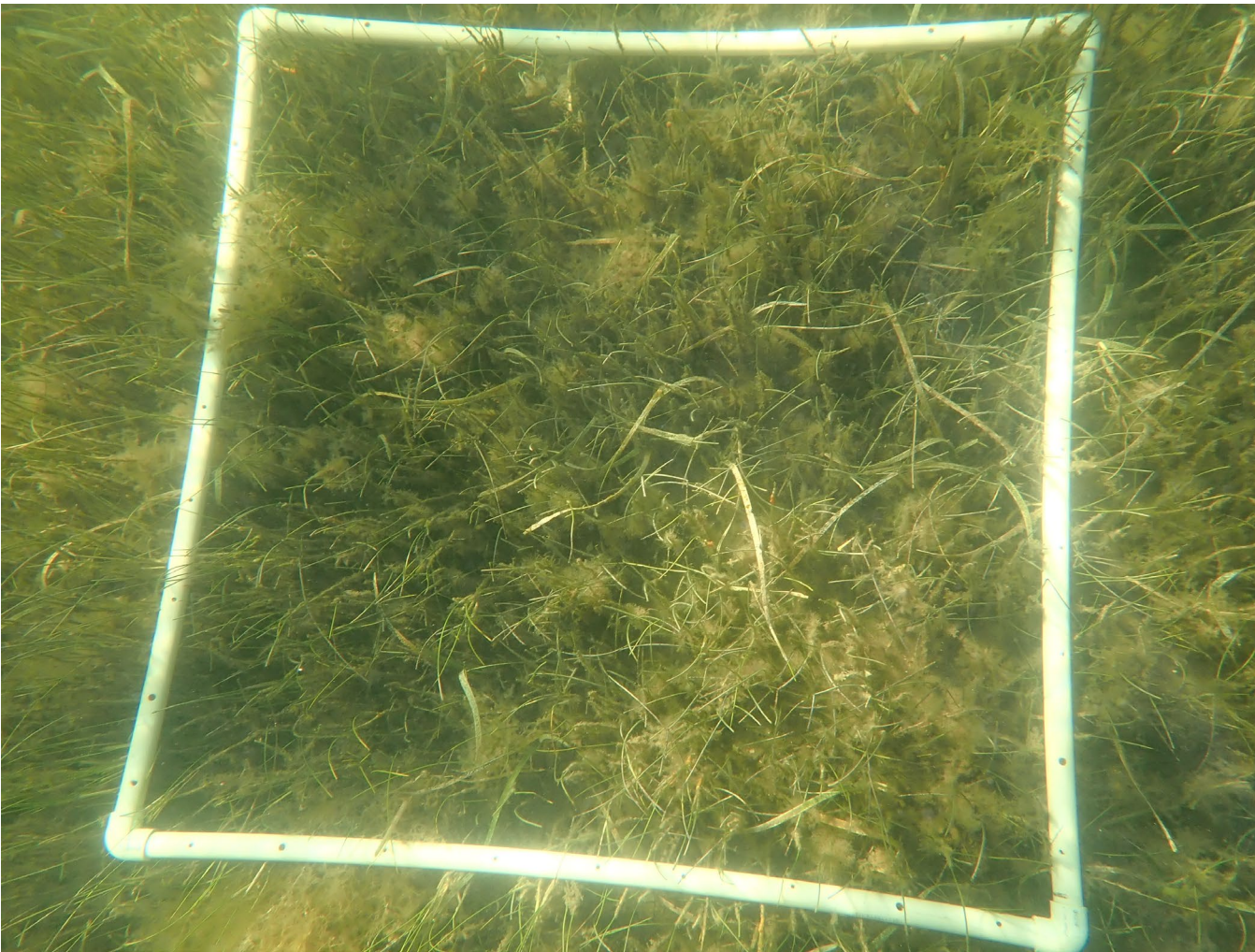
DBKB15 GPS: Latitude 29.8015
Longitude -83.6171



No urchins present

Urchin Survey DBKB15 Quad 3

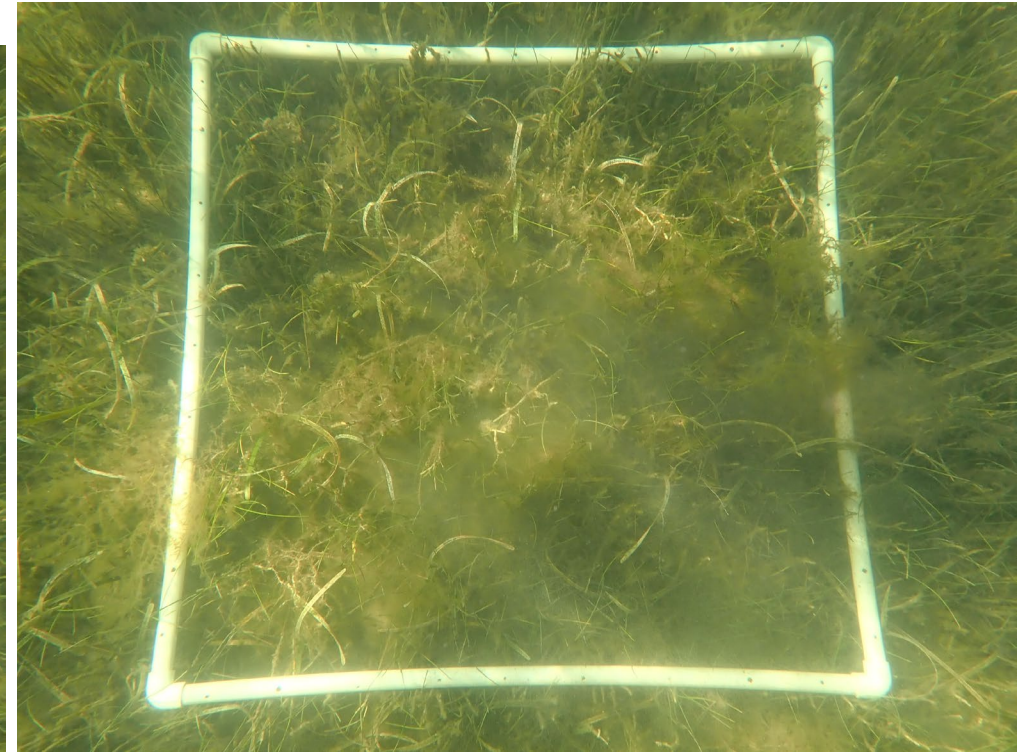
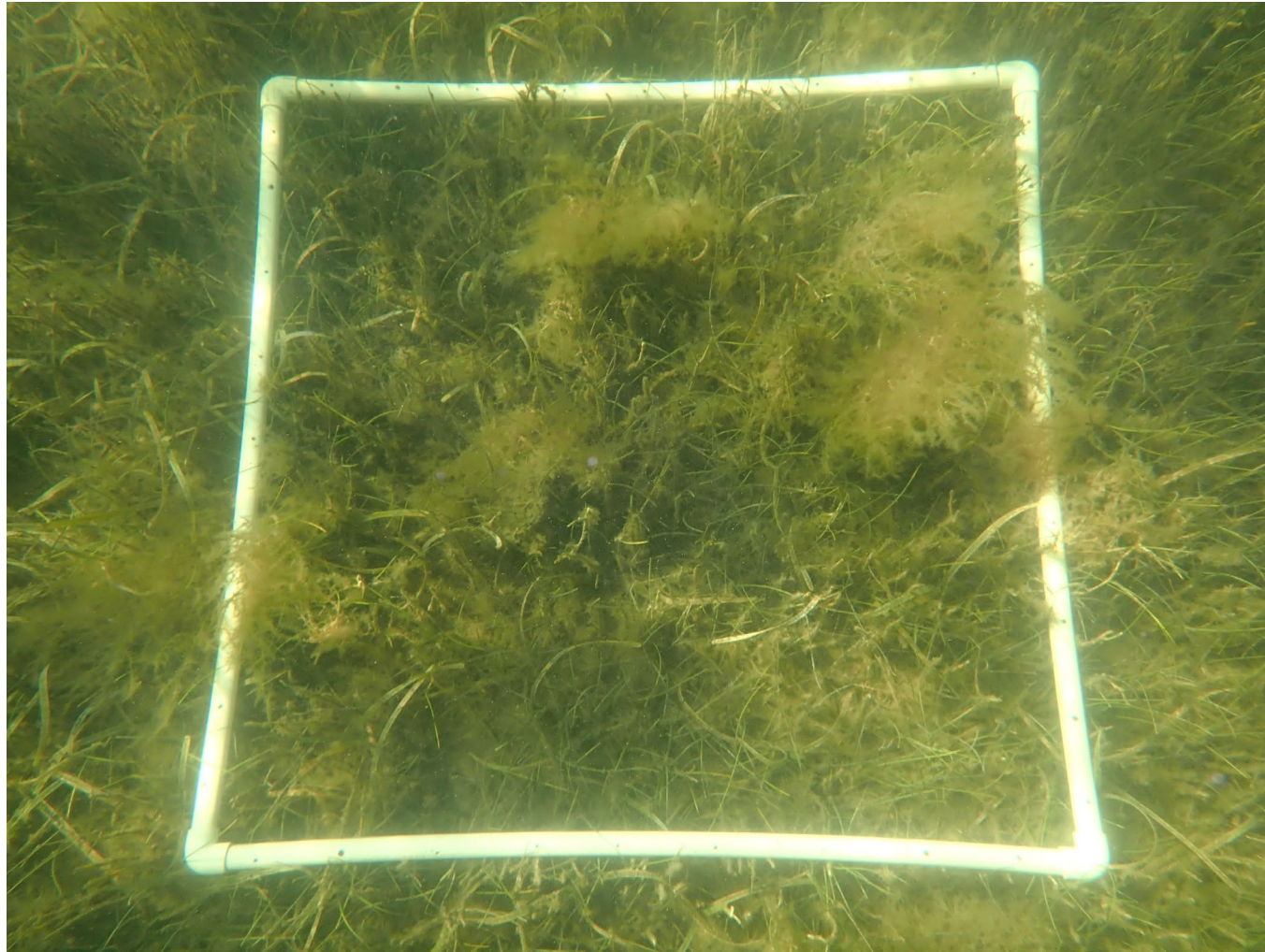
DBKB15 GPS: Latitude 29.8015
Longitude -83.6171



No urchins present

Urchin Survey DBKB15 Quad 4

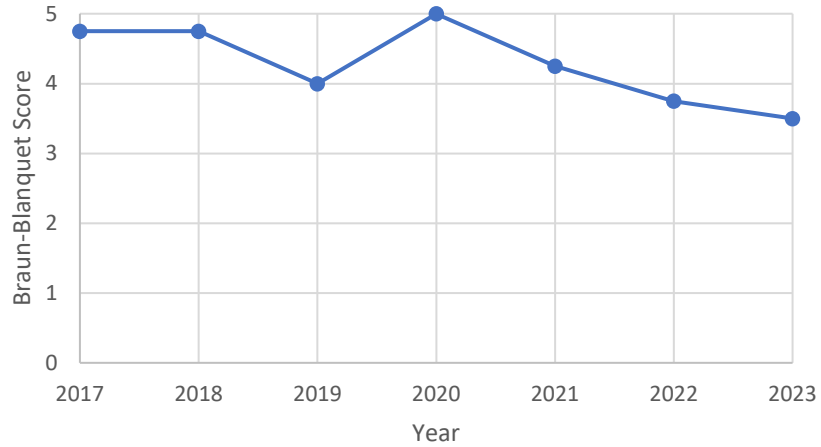
DBKB15 GPS: Latitude 29.8015
Longitude -83.6171



No urchins present

DBKB15 GPS: **Latitude** 29.8015

Longitude -83.6171



Year	Density (sum BB/4)
2017	4.75
2018	4.75
2019	4
2020	5
2021	4.25
2022	3.75
2023	3.5

A scatter plot comparing Percent Cover (Y-axis, 0 to 100) across four Quad numbers (X-axis: 1, 2, 3, 4) for the years 2022 (blue dots) and 2023 (orange dots). The data points are as follows:

Quad number	2022 Percent Cover	2023 Percent Cover
1	62	45
2	45	35
3	60	65
4	65	60

A line graph showing the Braun-Blanquet Score for two species, TTES Density (blue line) and SFIL Density (orange line), from 2017 to 2023. The Y-axis represents the Braun-Blanquet Score, ranging from 0 to 5. The X-axis represents the Year. TTES Density starts at 3 in 2017, decreases to 2 in 2018, 1.5 in 2019, 3 in 2020, 2.5 in 2021, 1.5 in 2022, and remains at 1.5 in 2023. SFIL Density starts at 2.2 in 2017, increases to 4 in 2018, remains at 4 in 2019, decreases to 3 in 2020, remains at 3 in 2021, increases to 3.8 in 2022, and decreases to 3 in 2023.

Year	TTES Density	SFIL Density
2017	3	2.2
2018	2	4
2019	1.5	4
2020	3	3
2021	2.5	3
2022	1.5	3.8
2023	1.5	3