Report on seagrass and Halimeda monitoring in Lac Bay 2020

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Submitted: January 2021

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Historical Data and Background

The first known qualitative seagrass survey in Lac Bay was conducted in 1969. Since then, additional quantitative surveys were conducted in 1999 and 2007 and on a regular basis since 2011 (2011, 2013, 2015, 2017, 2018, 2019, 2020).

After each survey, raw data for seagrass observations were uploaded to the Dutch Caribbean Biodiversity Database (DCBD) and have been referenced in numerous publications, most notably the seagrass and sea turtle research by Christianen and Smulders from Wageningen University and Research (WUR).

In 2010, the invasive species *Halophila stipulacea* was first documented in Lac Bay, and has continued to spread since. This is a concern as this species is fast growing and has been known to outcompete local species of seagrasses. If left unchecked, *Halophila stipulacea* is a threat to native seagrasses and the species of which depend on it (such as green turtle and queen conch).

Methodology

This survey was completed between July and December 2020. Throughout Lac Bay, 49 locations (Figure 1 and Appendix I) were selected at regular intervals and six $1m^2$ quadrants were examined. Each species was identified and percent coverage was noted. Each $1m^2$ quadrant was subdivided into 100 10 x 10 cm sections (Figure 2). Photographs of the most common seagrass species found within Lac Bay have been included as Figure 3. Presence of a species per section was noted, resulting in an overall percentage of cover. For example, if 3 sections of the quadrant had *H. stipulacea,* this was recorded as 3% coverage. This process was repeated six times by flipping the quadrant to measure adjacent substrates. Overall percent coverage was recorded as an average of the six quadrants. After the six quadrants were examined, the surveyor also made notes of any other species within the nearby area, and included this within the notes section of the data sheets.

In addition to seagrass, the calcareous algae, *Halimeda sp.* was also surveyed for percent coverage. Since 2018, observations of *Halimeda opuntia* and *Halimeda incrassata* have been recorded in Lac Bay. *Halimeda sp.* are calcareous algae (Figure 4) which are believed to be a significant contributor of calcareous sand within Lac Bay, and pose a threat due to infilling if the populations continue to increase. Halimeda can produce over 180 $gr/m^{-2}/year^{-1}$ (Drew, 1983). *Halimeda sp.* was recorded in the same way as the seagrass, noting the percentage of sections present and recording percent coverage.

Bioturbators have been added to the survey as they are believed to alter the substrate, which could affect the ability of various seagrasses and algae to grow. Bioturbators were recorded as an average number per square meter, although this sometimes varied

widely within a smaller area. It is recommended that a more consistent approach be added for future surveys. This will be explored later in the discussion section.

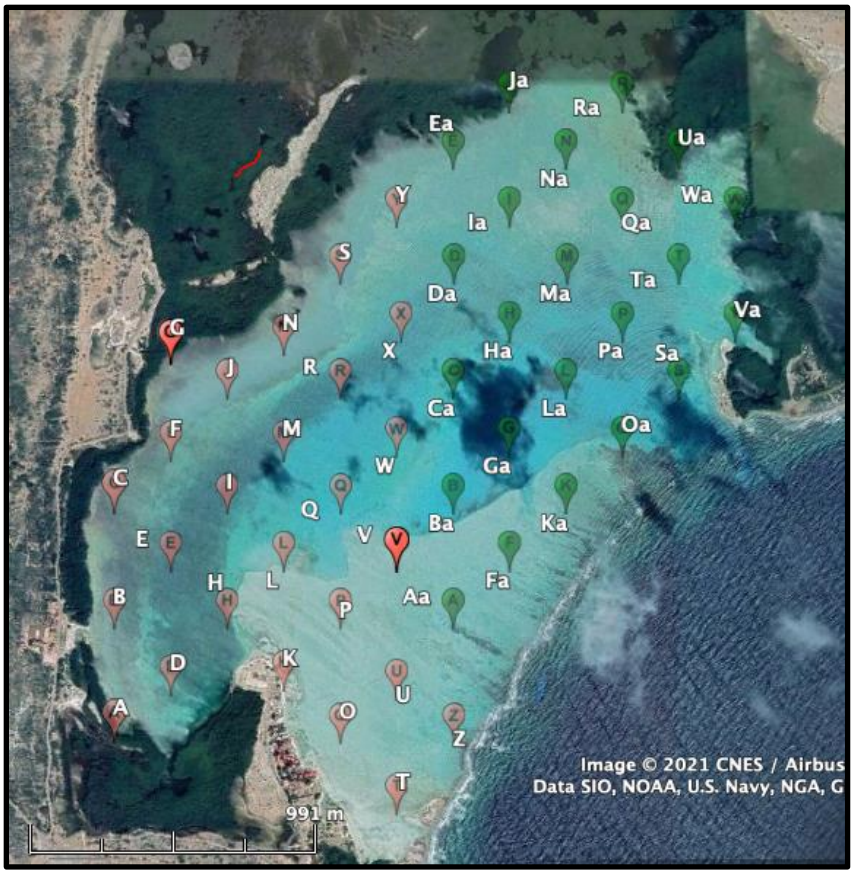

Figure 1: Map of 49 sites used during study

Figure 2: Example of 1m^2 quadrant used during study.

Results

During the 2020 survey, the following species of seagrass were observed:

- *Thalassia testudinum* (Turtlegrass, Species code: Tt) - IUCN Red List
- *Syringodium filiforme* (Manatee Grass, Species code Sf) - IUCN Red List
- *Halodule beaudettei* (Shoal grass, Species code Hy - IUCN Red List
- *Halophila stipulacea* (Species code: Hs) - IUCN Red List[1], invasive

Halodule beaudettei only occurs in location K (near Sorobon) and is not included in the tables of Appendix II, its cover is considered stable.

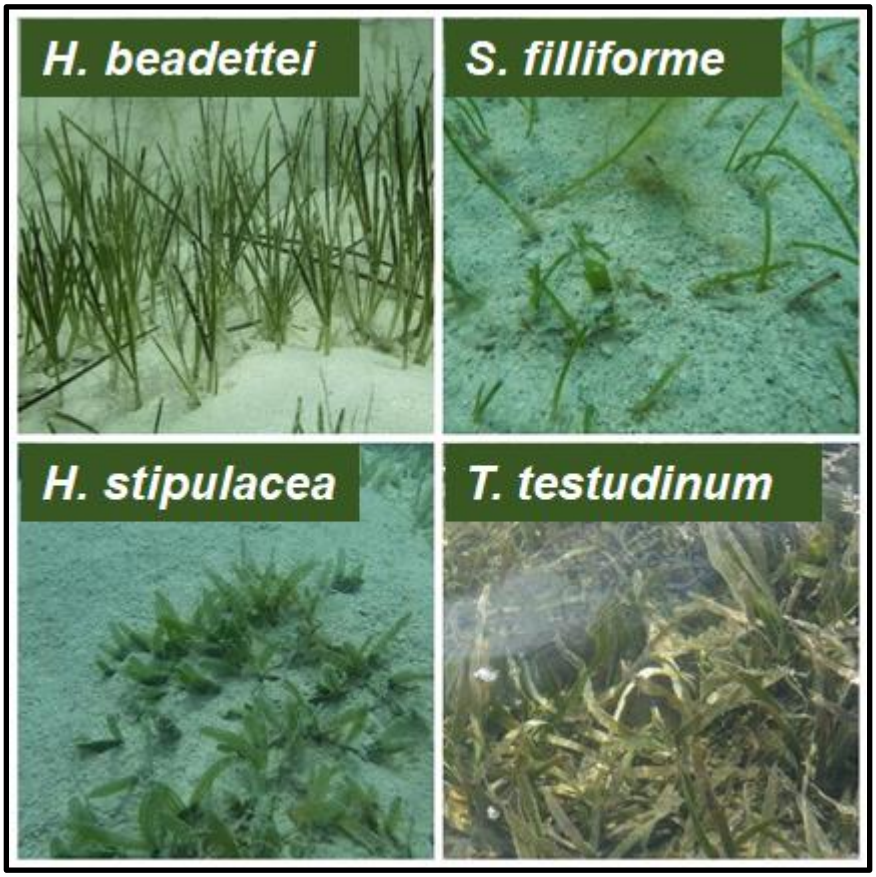

Figure 3: Photographs of each type of seagrass

A fifth species does occur in the general area: *Ruppia maritima*. However, this species was not observed in any of the 49 quadrants surveyed.

Data per species and percent coverage are recorded in Appendix II.

[1] on IUCN Red List because of occurrence as local species in a protected area. In the Meditteranean and Caribbean region Halophila stipulacea is considered an invasive species

Discussion

In recent monitoring (2019, 2020) pictures were taken of all quadrants surveyed as well as of the surrounding area.

Seagrass

Overall, there has been a decrease in the native species of *T. testudinum* and an increase in the invasive species *H. stipulacea.* *S. filliforme* populations appear to be stable, with a slight increase in coverage.

Sargassum has been an issue within Lac Bay, with several of the survey sites being locations where decaying sargassum has created a thick mat, which in most cases was slowly removed with the tide. Two of these sites, Locations A and G were completely covered by sargassum. Physical repercussions of the sargassum landings can be seen by the seagrass dieback all along the mangrove border from the south until just north of Punto Kalba.

Additionally, at location E, a very fluffy sediment was found to be covering the substrate. A likely explanation is that this is the result of decomposed sargassum settling at this site.

The overall cover by all species together seems to be stable, but in terms of biomass it would appear to be lower. The ecosystem services provided by *Halophila stipulacea* are significantly lower than those of *Thalassia testudinum* due to its shallow root structure (Smulders et al., 2017) and the fact that it is less nutrient rich than native seagrass species (Boman et al., 2019). The shift towards this nonnative species is of concern and should be closely monitored.

Halimeda

Since 2018 Halimeda species and bioturbation observations were added to the methodology of these surveys. 2020 Data on *Halimeda sp.* occurrence can be found in Appendix III.

Overall cover by Halimeda seems to have decreased but a longer time series is required to draw more definitive conclusions. Two students have looked into carbonate sand production by Halimeda during the Lac Ecological Restoration project: Laura Timmermans (2018) and Valeria Pesch (2019). Results from these studies were inconclusive, highlighting the need for additional research to fully understand the contribution of Halimeda to carbonate sands and infilling of the bay. In addition, more information is needed on the influence of eutrophication (Slijkerman et al., 2011) on this process.

Figure 4: Photos of *Halimeda opuntia*, one of two main species of Halimeda found in Lac Bay

Sand particles size in Lac was measured during the Conch Stock Restoration project. Larger fractions often show Halimeda segments next to small shells and other carbonate particles (Figure 5). For this reason, it is believed that *Halimeda sp.* are a major contributor of sand within the bay.

Sediments have been analyzed for carbonate content in several other studies such as the EHLZK project and during the baseline surveys conducted in 2012 (Debrot et al, 2012). Although the findings have not been published, the data showed that sediments towards the center of the bay have a higher $CaCO_3$ content, and the distribution sand, silt, clay changes (Appendix V). In addition, it was found that terrigenous sediments were most prevalent along the borders of Lac - mainly in the northwestern sector, whereas endogenous sediments were found in the central part of the bay and towards the reef.

Figure 5: Photograph of sand which had been passed through a 2mm sieve. Red circles highlight Halimeda.

Bioturbators

Bioturbators have also been added to recent surveys as it is believed to be important as it may cause a loss of sequestered carbon, and new sediment may facilitate settlement of *H. stipulacea*. Bioturbators are considered to be ecosystem engineers, changing the substrate landscape. Common bioturbators are callianassid (burrowing ghost) shrimp, the lugworm, mantis shrimp and the burrowing sea cucumber. To date, surveys have only included rough estimates as to the number of mounds per square meter.

After discussing this issue among local researchers, it has been decided to amend the protocol for next year to count all mounds in the same quadrant as the seagrass cover. If more than half of the mound falls out of the quadrant the mound will not be counted.

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Appendix I: GPS Coordinates of 49 sites

name	latitude	longitude	name	latitude	longitude
A	12.0925000	-68.2416667	Aa	12.0961111	-68.2308333
B	12.0961111	-68.2416667	Ba	12.0997222	-68.2308333
C	12.0997222	-68.2416667	Ca	12.1033333	-68.2308333
D	12.0940278	-68.2398611	Da	12.1069444	-68.2308065
E	12.0979167	-68.2398611	Ea	12.1105556	-68.2308333
F	12.1013889	-68.2398611	Fa	12.0979167	-68.2290289
G	12.1044444	-68.2398611	Ga	12.1015278	-68.2290456
H	12.0961111	-68.2380556	Ha	12.1051389	-68.2290278
I	12.0997222	-68.2380556	Ia	12.1087500	-68.2290278
J	12.1033333	-68.2380556	Ja	12.1123611	-68.2290445
K	12.0941667	-68.2362500	Ka	12.0997222	-68.2272222
L	12.0979167	-68.2362500	La	12.1033333	-68.2272222
M	12.1013889	-68.2362500	Ma	12.1069444	-68.2271893
N	12.1047222	-68.2362500	Na	12.1105556	-68.2272222
O	12.0925004	-68.2344444	Pa	12.1051389	-68.2254167
P	12.0961111	-68.2344444	Oa	12.1015278	-68.2254167
Q	12.0997222	-68.2344295	Qa	12.1087500	-68.2254167
R	12.1033333	-68.2344444	Ra	12.1123611	-68.2254167
S	12.1069444	-68.2344444	Sa	12.1033333	-68.2236111
T	12.0902778	-68.2326389	Ta	12.1069444	-68.2236111
U	12.0938889	-68.2326389	Ua	12.1105556	-68.2236111
V	12.0979167	-68.2326389	Va	12.1051389	-68.2218056
W	12.1015278	-68.2326389	Wa	12.1087500	-68.2218056
X	12.1051389	-68.2324967			
Y	12.1087500	-68.2326389			
Z	12.0925000	-68.2308082			

Appendix II: Thalassia testudinum percent coverage 2011- 2020

Appendix II: Thalassia testudinum

	2011 Tt	2013 Tt	2015 Tt	2017 Tt	2019Tt	2020Tt	Total 2020
A	0	98.5	100	99.8333333	0	0	1.16666667
Aa	0	0	0	0	0	29.1666667	29.1666667
B	100	99.5	99	100	100	100	100
Ba	63.3333333	42.8333333	68.8333333	66.3333333	43.3333333	22.3333333	98.6666667
C	99.6666667	100	1.33333333	29	99.8333333	94.1666667	94.1666667
Ca	39.6666667	0	0	0	0	0	10.5
D	16.1666667	1.83333333	0	0	0	0	98.3333333
Da	61.3333333	21.6666667	5.5	9.5	3.16666667	0	99.8333333
E	7.16666667	1	2.5	0.33333333	0.16666667	0	1.66666667
Ea	95.8333333	98.3333333	100	90.6666667	74.5	83.5	124.666667
F	100	98.8333333	100	100	99.5	100	100
Fa	0	6.16666667	0	0	0	0	0
G	100	98.3333333	99.1666667	99.8333333	0	0	42.8333333
Ga	0	0	0	0	0	0	1
H	42	46.8333333	12.6666667	15.6666667	1.16666667	1.83333333	101.833333
Ha	60.3333333	19	0	0	0	0	97.5
I	85.8333333	80.5	87.6666667	91.3333333	38.8333333	83.1666667	182.833333
Ia	99.3333333	100	76.3333333	90.5	57	11.5	111
J	100	100	100	100	100	100	100
Ja	99.1666667	0	100	100	100	100	100
K	93	76.1666667	0	6.66666667	0	0	0
Ka	0	0	0	0	0	0	0
L	12	8.5	0	0	0	0	0
La	11.5	4.16666667	0	0	0	0	0.66666667
M	52.8333333	24.8333333	22.6666667	36.1666667	18.5	23.3333333	93.6666667
Ma	0.33333333	0	0	2	0	9.333	108.499667
N	100	99.6666667	99.6666667	100	100	100	100
Na	97.3333333	96	15.8333333	26	18.6666667	61.5	158.333333
O	8.33333333	2.83333333	0	0	3.16666667	12.1666667	12.1666667
Oa	0	0	56.1666667	0	71.3333333	0.83333333	0.83333333
P	0	0	0	0	0	0	0
Pa	30.6666667	2	0	2.16666667	1.66666667	90.3333333	183.166667
Q	0	0	0	0	0	0	65
Qa	99.8333333	17	4.16666667	7	6.5	1.66666667	5.33333333
R	55.8333333	24.5	24.3333333	27.6666667	1.83333333	18.1666667	118
Ra	0	12.5	0.5	0	0	0	2.16666667
S	99.6666667	98.6666667	100	100	98.6666667	100	100
Sa	98.6666667	26	0	0	0	0	99.8333333
T	79.5	93.1666667	82.8333333	78.5	52.6666667	0	0
Ta	94	76.5	39.1666667	28.5	14.5	32.5	127
U	0	0	0	0	0	0	0
Ua	100	100	99.6666667	100	100	10	10
V	0	0	0	0	0	0	0
Va	0	0.5	1	0	5	0	84
W	0	0	3.5	0	0	0	99.3333333
Wa	100	90.1666667	23.8333333	47.3333333	57.3333333	19.5	19.5
X	38.3333333	15	2.5	1.5	0.66666667	0	188.666667
Y	0	98.1666667	99.8333333	90	22	85.3333333	182
Z	0	0	0	0	0	0	0
Mean per q		40.4013605	33.2380952	33.6020408	26.3265306	26.3333265	66.394551

Appendix II: Syringodium filiforme percent coverage 2011- 2020

Appendix II. Syringodium filliforme

	2011 Sf	2013 Sf	2015 Sf	2017 Sf	2019 Sf	2020 Sf	Total 2020
A	0	0	0	0	0	0	1.16666667
Aa	0	0	0	0	0	0	29.1666667
B	0	0	0	0	0	0	100
Ba	0	0	97.5	96.8333333	93.1666667	76.3333333	98.6666667
C	0	0	0	0	0	0	94.1666667
Ca	0	0	0	0	0	0	10.5
D	0	0	0	0	0	0	98.3333333
Da	0	0	0	0	0		99.8333333
E	0	0	0	0	0	0	1.66666667
Ea	0	0	0	0	0	0	124.666667
F	0	0	0	0	0	0	100
Fa	0	0	0	0	0	0	0
G	0	0	0	0	0	0	42.8333333
Ga	0	0	0	0	0	0	1
H	0	0	0	0	0	0	101.833333
Ha	0	0	0	0	0	0	97.5
I	0	0	0	0	0	0	182.833333
Ia	0	0	0	0	0	0	111
J	0	0	0	0	0	0	100
Ja	0	0	0	0	0	0	100
K	0	0	0	0	0	0	0
Ka	0	0	0	0	0	0	0
L	0	0	0	0	0	0	0
La	0	0	0	0	0	0	0.66666667
M	0	0	0	0	0	0	93.6666667
Ma	0	0	0	0	0		108.499667
N	0	0	0	0	0	0	100
Na	0	0	0	0	0	0	158.333333
O	0	0	0	0	0	0	12.1666667
Oa	0	0	0	0	0	0	0.83333333
P	0	0	0	0	0	0	0
Pa	93.8333333	0.66666667	48.5	19.6666667	20.1666667	0	183.166667
Q	0	0	0	0	0	31.8333333	65
Qa	0	0	0	0	0	0	5.33333333
R	0	0	0	0	0	0	118
Ra	0	0	0	0	0	0	2.16666667
S	0	0	0	0	0	0	100
Sa	0	58.6666667	0	0	0	0	99.8333333
T	0	0	0	0	0	0	0
Ta	0	0	0	0	0	0	127
U	0	0	0	0	0	0	0
Ua	0	0	0	0	0	0	10
V	0	0	0	0	0	0	0
Va	0	0	0	0	0	0	84
W	0	0	0	0	0	99.3333333	99.3333333
Wa	0	0	0	0	0	0	19.5
X	95	89.8333333	42.8333333	42.8333333	21.6666667	88.6666667	188.666667
Y	0	0	0	0	0	0	182
Z	0	0	0	0	0	0	0
Mean per q		3.04421769	3.8537415	3.25170068	2.75510204	6.04421769	66.394551

Appendix II: Halophila stipulacea percent coverage 2011- 2020

Appendix II: Halophila stipulacea

	Total 2011	Total 2013	Total 2015	Total 2017	Total 2019	Total 2020
A	0	0.00	0	0.00	64.8333333	1.166667
Aa	0	0.00	0	0.00	0	0
B	0	0.00	0	0.00	0	0
Ba	4.5	0.00	0	0.00	0	0
C	0	0.00	0	59.00	0	0
Ca	0	0.00	0	11.50	0	10.5
D	1.33333333	18.83	24.1666667	41.67	86	98.33333
Da	0	99.00	93.3333333	94.00	94.1666667	99.83333
E	0	15.00	98.3333333	98.67	100	1.666667
Ea	0	0.00	0	1.00	23.3333333	41.16667
F	0	0.00	0	0.00	0	0
Fa	0	0.00	0	0.00	0	0
G	0	0.00	0	0.00	0	42.83333
Ga	0	0.00	0	0.00	0.66666667	1
H	90.3333333	96.17	100	99.83	99.8333333	100
Ha	42.6666667	2.83	99.8333333	92.00	97.3333333	97.5
I	0	0.00	58.3333333	90.33	81.8333333	99.66667
Ia	0	0.00	2.33333333	7.33	29.5	99.5
J	0	0.00	0	0.00	0	0
Ja	0	0.00	0	0.00	0	0
K	0	0.00		0.00	0	0
Ka	0	0.00	0	0.00	0	0
L	0	0.00	0	0.00	0	0
La	0	0.00	0	0.00	0	0.666667
M	0	54.00	42.1666667	44.00	61.5	70.33333
Ma	0	97.17	98.8333333	99.67	99	99.16667
N	0	0.00	0	0.00	0	0
Na	0	0.00	0	93.67	80.8333333	96.83333
O	0	0.00	0	0.00	0	0
Oa	0	0.00	0	0.00	0	0
P	0	0.00	0	0.00	0	0
Pa	42.4	99.17	86.8333333	99.33	97.1666667	92.83333
Q	0	0.00	41.1666667	0.00	0	33.16667
Qa	0	0.00	0	0.00	0	3.666667
R	98.5	91.67	82.6666667	99.17	84	99.83333
Ra	0	40.67	0	1.50	10.6666667	2.166667
S	0	0.00	0	0.00	0	0
Sa	0	0.00		0.00	20.6666667	99.83333
T	0	0.00		0.00	0	0
Ta	0	0.00	54	90.67	97.6666667	94.5
U	0	0.00	0	0.00	0	0
Ua	0	0.00	0	0.00	0	0
V	0	0.00	0	0.00	0	0
Va	14.6666667	78.17	0	0.00	2	84
W	0	0.00	0	0.00	0	0
Wa	0	0.00	0	0.00	0	0
X	0	4.50	99	96.17	98.1666667	100
Y	0	0.00	0	0.00	98.1666667	96.66667
Z	0		0	0.00	0	0
	6.00816327	14.52	20.8723404	24.89	29.1292517	34.0170066

Appendix II: Total (Tt, Sf, Hs) percent coverage 2011- 2020

Appendix II Total

	Total 2011	Total 2013	Total2015	Total2017	Total 2019	Total 2020
A	0	98.5	100	99.8333333	64.8333333	1.16666667
Aa	0	0	0	0	0	29.1666667
B	100	99.5	99	100	100	100
Ba	67.8333333	42.8333333	166.333333	168.166667	136.5	98.6666667
C	99.6666667	100	1.33333333	88	99.8333333	94.1666667
Ca	39.6666667	0	0	11.5	0	10.5
D	17.5	20.6666667	24.1666667	41.6666667	86	98.3333333
Da	61.3333333	120.666667	98.8333333	103.5	97.3333333	99.8333333
E	7.16666667	16	100.833333	99	100.166667	1.66666667
Ea	95.8333333	98.3333333	100	91.6666667	97.8333333	124.666667
F	100	98.8333333	100	100	99.5	100
Fa	0	6.16666667	0	0	0	0
G	100	98.3333333	99.1666667	99.8333333	0	42.8333333
Ga	0	0	0	0	0.66666667	1
H	132.333333	143	112.666667	115.5	101	101.833333
Ha	103	21.8333333	99.8333333	92	97.3333333	97.5
I	85.8333333	80.5	146	181.666667	120.666667	182.833333
Ia	99.3333333	100	78.6666667	97.8333333	86.5	111
J	100	100	100	100	100	100
Ja	99.1666667	0	100	100	100	100
K	93	76.1666667	0	6.66666667	0	0
Ka	0	0	0	0	0	0
L	12	8.5	0	0	0	0
La	11.5	4.16666667	0	0	0	0.66666667
M	52.8333333	78.8333333	64.8333333	80.1666667	80	93.6666667
Ma	0.33333333	0	98.8333333	101.666667	99	108.499667
N	100	99.6666667	99.6666667	100	100	100
Na	97.3333333	96	15.8333333	119.666667	99.5	158.333333
O	8.33333333	2.83333333	0	0	3.16666667	12.1666667
Oa	0	0	56.1666667	0	71.3333333	0.83333333
P	0	0	0	0	0	0
Pa	138.833333	101.833333	135.333333	121.166667	119	183.166667
Q	0	0	41	0	0	65
Qa	99.8333333	17	4.16666667	7	6.5	5.33333333
R	154.333333	116.166667	107	126.833333	85.8333333	118
Ra	0	53.1666667	0.5	1.5	10.6666667	2.16666667
S	99.6666667	98.6666667	100	100	98.6666667	100
Sa	98.6666667	84.6666667	0	0	20.6666667	99.8333333
T	79.5	93.1666667	82.8333333	78.5	52.6666667	0
Ta	94	76.5	93.1666667	119.166667	112.166667	127
U	0	0	0	0	0	0
Ua	100	100	99.6666667	100	100	10
V	0	0	0	0	0	0
Va	14.6666667	78.6666667	1	15	7	84
W	0	0	3.5	0	0	99.3333333
Wa	100	90.1666667	23.8333333	47.3333333	57.3333333	19.5
X	133.333333	109.333333	144.333333	140.5	120.5	188.666667
Y	0	98.1666667	99.8333333	90	120.166667	182
Z	0	0	0	0	0	0
Mean per q	57.0782313	55.6904762	57.1088435	62.1496599	58.2108844	66.394551

Appendix III: Halimeda cover comparison between 2018 and 2020

Appendix III Halimeda cover

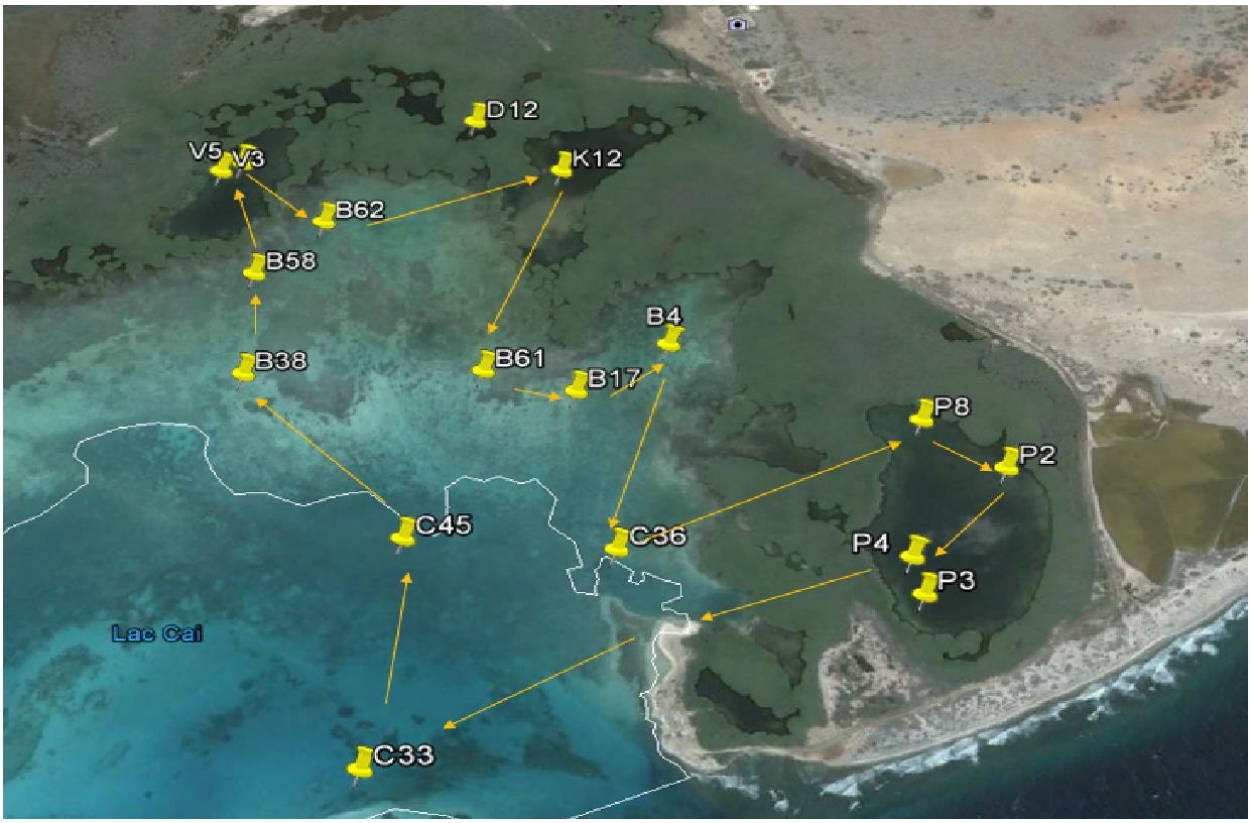
		2018	2020
A	Hal O	0	0
	Hal I	0	0
B	Hal O	6	0
	Hal I	21.33333	9
C	Hal O		0
	Hal I		8.5
D	Hal O		0
	Hal I		0
E	Hal O		0
	Hal I		0
F	Hal O	0	0
	Hal I	2.5	0
G	Hal O	0	0
	Hal I	48.16667	1.5
H	Hal O	0	0
	Hal I	0	0
I	Hal O		0
	Hal I		0
J	Hal O	2.333333	0
	Hal I	0	2.5
K	Hal O		0
	Hal I		0
L	Hal O	0	0
	Hal I	0	0
M	Hal O	0	0
	Hal I	0	0
N	Hal O		0
	Hal I		3.666667
O	Hal O	0	0
	Hal I	0	0
P	Hal O	0	0
	Hal I	0	0
Q	Hal O	0	0
	Hal I	0	0.833333

		2018	2020
R	Hal O	0	0
	Hal I	0.166667	0
S	Hal O	0	1
	Hal I	5.166667	26.5
T	Hal O	0	0
	Hal I	0	0
U	Hal O	0	0
	Hal I	0	0
V	Hal O		0
	Hal I		0
W	Hal O		0
	Hal I		3.166667
X	Hal O	0	0
	Hal I	0	0
Y	Hal O	0	0
	Hal I	0.833333	0
Z	Hal O	1	0
	Hal I	0.833333	0
Aa	Hal O		0
	Hal I		0
Ba	Hal O		0
	Hal I		0
Ca	Hal O	0	0
	Hal I	0	0.5
Da	Hal O		0
	Hal I		0
Ea	Hal O	0	1.333333
	Hal I	92.83333	0
Fa	Hal O		0
	Hal I		0
Ga	Hal O		0
	Hal I		0
Ha	Hal O		0
	Hal I		0.166667

		2018	2020
Ia	Hal O	0	0
	Hal I	1.166667	0.5
Ja	Hal O	12.33333	3.666667
	Hal I	22.33333	31.5
Ka	Hal O		0.666667
	Hal I		28.66667
La	Hal O	0	0
	Hal I	0	0
Ma	Hal O	0	0
	Hal I	0	15.83333
Na	Hal O	0	8.333333
	Hal I	43.5	33.16667
Oa	Hal O	17.5	23.33333
	Hal I	0	0
Pa	Hal O	0	0
	Hal I	0	0
Qa	Hal O	1	0
	Hal I	0	0
Ra	Hal O		0
	Hal I		0
Sa	Hal O		0
	Hal I		0.5
Ta	Hal O	0	0
	Hal I	3.833333	1.166667
Ua	Hal O	0	12
	Hal I	95.5	25.5
Va	Hal O	0.333333	0
	Hal I	0	0
Wa	Hal O	0	0
	Hal I	30.83333	0.833333
Total		409.5	244.3333

*Some data deficient sites from 2018 were left blank, this should not be assumed to be zero.

Appendix IV: Data on Sediments



Analysis sediment samples

Name	Veldcode	Initial Mass	Moisture	LOI330	LOI550	CaCO3tot	Method
189625	B4	1.4559	0.4438	0.7072	2.636	96.58	StandaardLOI550CaCo3
189626	B17	0.8846	7.188	1.123	3.685	96.82	StandaardLOI550CaCo3
189627	B38	1.1497	1.643	0.8594	2.8	95.79	StandaardLOI550CaCo3
189628	B58	1.3091	1.294	1.301	3.715	96	StandaardLOI550CaCo3
189629	B61	1.1378	0.7335	1.297	3.8	96.02	StandaardLOI550CaCo3
189630	B62	1.2527	1.208	1.169	3.309	95.26	StandaardLOI550CaCo3
189631	C33	1.9709	0.2422	0.7366	2.615	95.33	StandaardLOI550CaCo3
189632	C36	1.386	0.315	0.7874	2.556	95.95	StandaardLOI550CaCo3
189633	C45	1.6559	0.5215	1.068	3.093	95.27	StandaardLOI550CaCo3
189634	D12	1.6192	39.41	12.91	21.25	70.5	StandaardLOI550CaCo3
189635	K12	1.5975	1.033	1.3	3.338	96.03	StandaardLOI550CaCo3
189636	P2	1.5174	20.07	3.532	7.005	95.08	StandaardLOI550CaCo3
189637	P3	1.5513	0.497	1.549	3.498	95.63	StandaardLOI550CaCo3
189638	P4	1.1883	20.07	2.175	4.879	95.91	StandaardLOI550CaCo3
189639	P8	1.6593	3.587	1.437	3.482	95.41	StandaardLOI550CaCo3
189640	V3	1.276	4.439	1.899	4.631	92.69	StandaardLOI550CaCo3
189641	V5	1.5904	7.009	1.924	4.422	93.22	StandaardLOI550CaCo3
189642	BW1	1.2418	14.59	5.393	14.29	18.15	StandaardLOI550CaCo3
189643	BW2	1.1658	17.97	5.178	14.17	15.08	StandaardLOI550CaCo3
189644	LG1	1.9005	0.5805	1.113	4.263	4.899	StandaardLOI550CaCo3
189645	LG2	1.9343	0.5092	0.9269	3.541	4.635	StandaardLOI550CaCo3
189646	Kreek Pedro	1.5979	1.883	22.36	45.01	4.738	StandaardLOI550CaCo3