Report on Queen Conch (Lobatus gigas) Population Monitoring in Lac Bay 2020.

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Submitted: January 2021

Historical Data

A study conducted in 1969 by Hummelinck and Roos gave the first qualitative data for queen conch general distribution throughout Lac Bay. In 2000, a study by Lott presented the first quantitative data within the same study area. This was followed by a second survey in 2007. From 2010 onwards (Conch Stock Restoration Project) assessment of queen conch population has been done at irregular intervals (2010, 2013, 2015, 2016, 2020).

Background

Queen conchs are a highly valued mollusk due to its unique shell which has cultural and decorative value and meat which is used in local cuisine. Poaching of this species has led to an overall depletion of stock over the last few decades. A project started in the 80's, “Markultura”, worked to boost local populations by cultivating conch to be released in the bay (Hensen, 1983). Unfortunately, the only long-term result was that people started collecting smaller conchs and there were no positive impacts to the conch populations.

The conch middens (old shells) which can be seen in large piles along the beach at Lac Cai are from conch caught locally and brought in from the Aves Islands.

Since November 1992, queen conch has been listed as an CITES Appendix II species, which means it is at risk of endangerment. However, due to concerns over local populations, taking conch from Bonaire has been forbidden since 1985. Only legal imports (from countries with CITES export permit) are allowed. Unfortunately, poaching is still an ongoing issue for the island.

Other species in the genus *Lobatus* and *Strombus* are *Lobatus raninus*, *Lobatus costatus* and *Strombus pugilus*. *Lobatus costatus* are taken incidentally but the shell is very thick and has very little meat.

2020 Survey Methodology

This survey was completed between July and December 2020. Throughout Lac Bay, 49 locations (Figure 1) were selected at regular intervals and a 30 by 30 m quadrant was set out and surveyed. This was completed by laying out 4 reel measuring tapes along the bottom to mark the outer periphery of the quadrant.

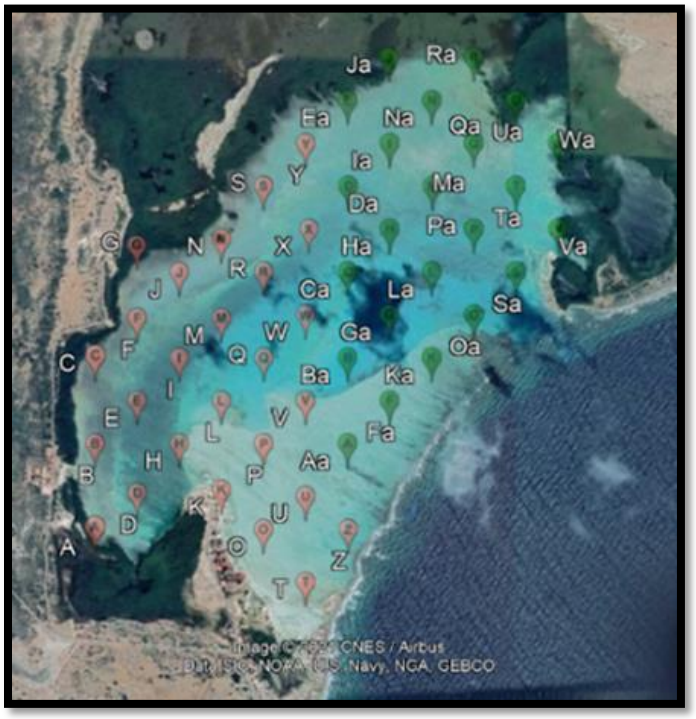

Figure 1: Map of 49 quadrants used during study

Depending on water depth and visibility the surveys were either conducted using snorkel or scuba equipment. The survey was completed using a “U” pattern (Figure 2) such that 100% of the substrate could be visually covered over the course of the survey. Two surveyors completed the pattern in opposite directions to ensure redundancy and full coverage.

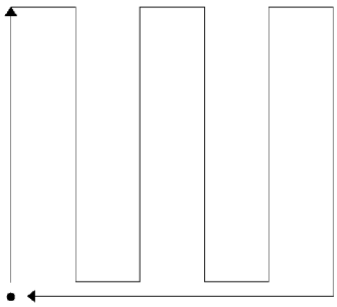

Figure 2: “U” pattern used during survey

During the survey, all live conchs were collected and measured (total length and lip thickness). Figure 3 represents how lip thickness (left) and total length (right) were measured. Queen conchs are known to grow to a certain size (usually 25 - 30 cm) after which their length does not increase anymore and their outer lip thickens. Sexual maturity is typically reached once the lip thickness is 10 - 12 mm (> 3 years). Presence of (recently) poached conch was also noted. Density of conch is expressed in the number of conches per ha. This is an international accepted format given the Allee effect (Aranda et al., 2014).

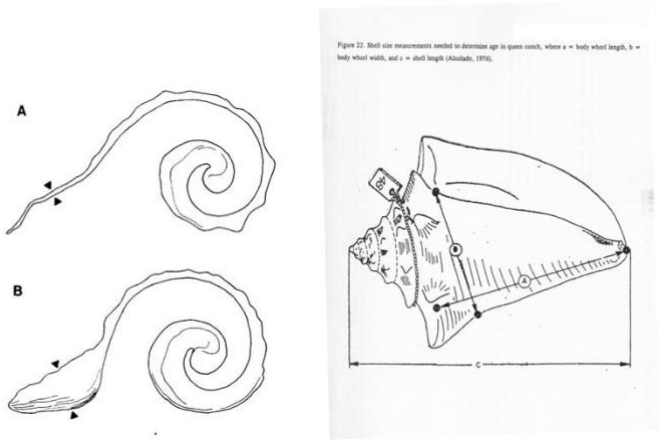

Figure 3: Diagram for measuring lip thickness (left) and total length (right)

Results

A total of 43,200 m^2 was surveyed and **85 live conchs** were found and measured. This resulted in a population density of **19.27 conchs / Ha**.

To use the Allee effect, only sexually mature conchs should be considered. Over the course of this study, **no sexually mature conchs were found**, the oldest conch had a lip thickness which measured 6 mm.

Below, Table 1 has been included to summarize the results of the last 5 surveys (2010, 2013, 2015, 2016, 2020). It is interesting to note the dramatic increase between conch populations in 2010 and 2013, and then the rapid decrease in follow on surveys. The results of the 2020 survey highlight a significant issue with only 85 conchs found, none of which having reached sexual maturity. Figure 4 shows a map with the total number of live conchs found per location. There was also a significant number of poached conchs (Table 2/Figure 5) found within the bay. In fact, there were more poached conch shells (100) found than live conch (85), demonstrating that poaching is still an issue which needs to be addressed before the conch population can rebound.

Each quadrant (quantity 49) equates to 0.09 ha. Using this value, the following densities per year were calculated:

2010 (6.35 conchs/ha), 2013 (51.70 conchs/ha), 2015 (46.49 conchs/ha), 2016 (21.54 conchs/ha), 2020 (19.27 conchs/ha)

Disclaimer: It is not recommended to publish population maps publicly as this could be used as a tool for poachers.

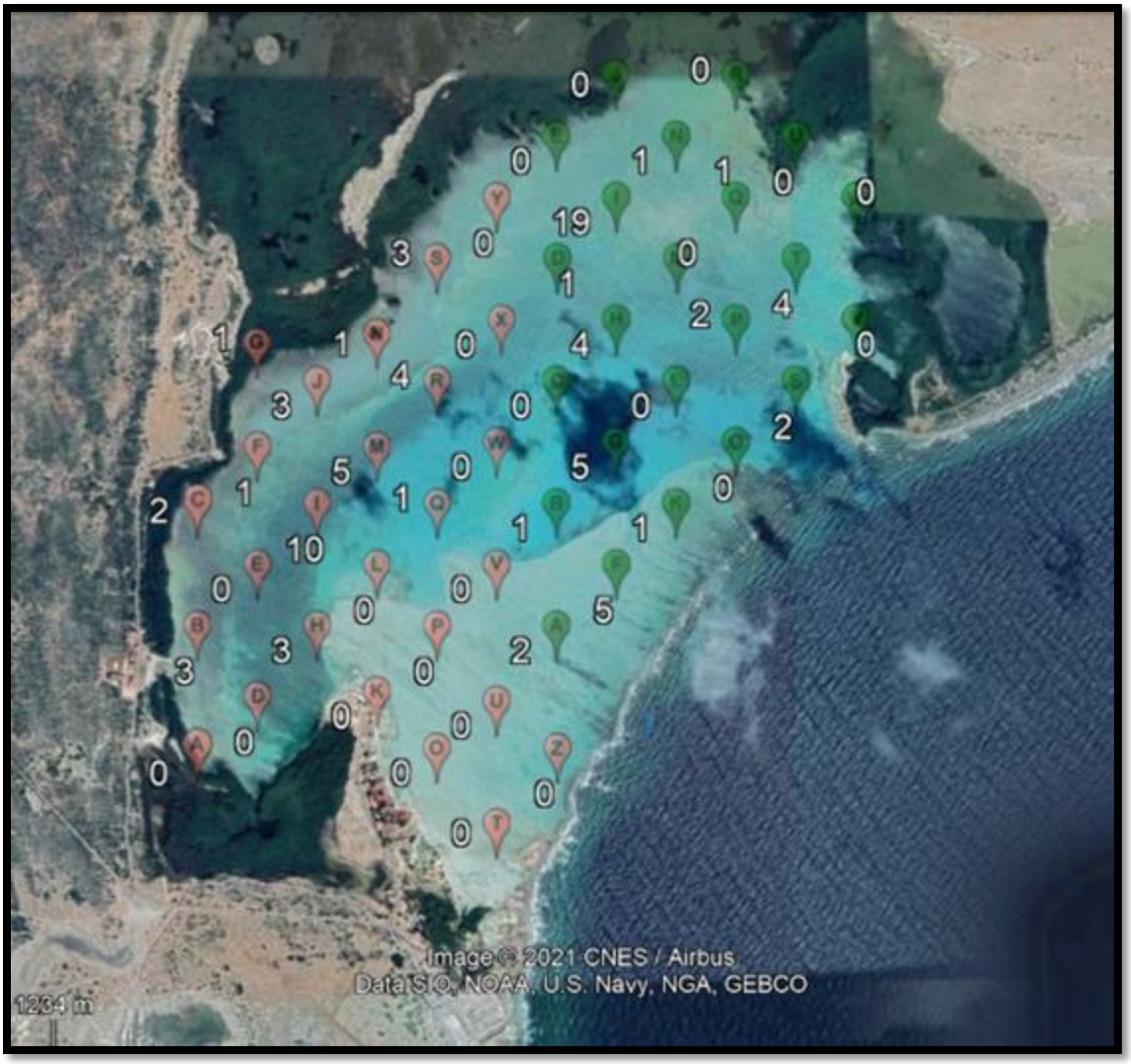

Figure 4: Map of Lac Bay, Red arrows represent A-Z, Green arrows represent Aa - Wa. Numbers represent the number of live conchs found at each site.

Table 1: Number of conchs counted at each site for surveys conducted since 2010

	2010	2013	2015	2016	2020
A	0	0	0	0	0
B	1	1	0	2	3
C	3	1	0	0	2
D	0	0	0	0	0
E	2	0	1	0	0
F	0	3	1	2	1
G	0	0	1	0	1
H	0	3	2	1	3
I	1	8	9	6	10
J	2	0	0	0	3
K	0	17	0	3	0
L	1	12	0	0	0
M	4	18	6	1	5
N	4	2	0	1	1
O	0	1	0	1	0
P	0	0	0	0	0
Q	0	7	7	1	1
R	0	5	0	1	4
S	0	0	9	4	3
T	0	3	0	1	0
U	0	0	0	0	0
V	0	8	1	1	0
W	3	0	0	0	0
X	0	2	1	0	0
Y	0	0	2	0	0
Z	0	0	0	0	0
Aa	0	8	1	6	2
Ba	1	4	66	6	1
Ca	0	22	2	1	0
Da	0	4	0	0	1
Ea	0	0	0	0	0
Fa	1	7	2	3	5
Ga	1	0	55	8	5
Ha	0	12	4	0	4
Ia	1	2	0	9	19
Ja	0	0	0	0	0
Ka	0	3	0	2	1
La	0	1	1	21	0
Ma	0	1	0	0	0
Na	0	0	0	0	1
Oa	0	0	0	0	0
Pa	0	15	5	9	2
Qa	1	2	16	3	1
Ra	0	0	0	0	0
Sa	1	55	7	0	2
Ta	1	1	6	2	4
Ua	0	0	0	0	0
Va	0	0	0	0	0
Wa	0	0	0	0	0
Total	**28**	**228**	**205**	**95**	**85**

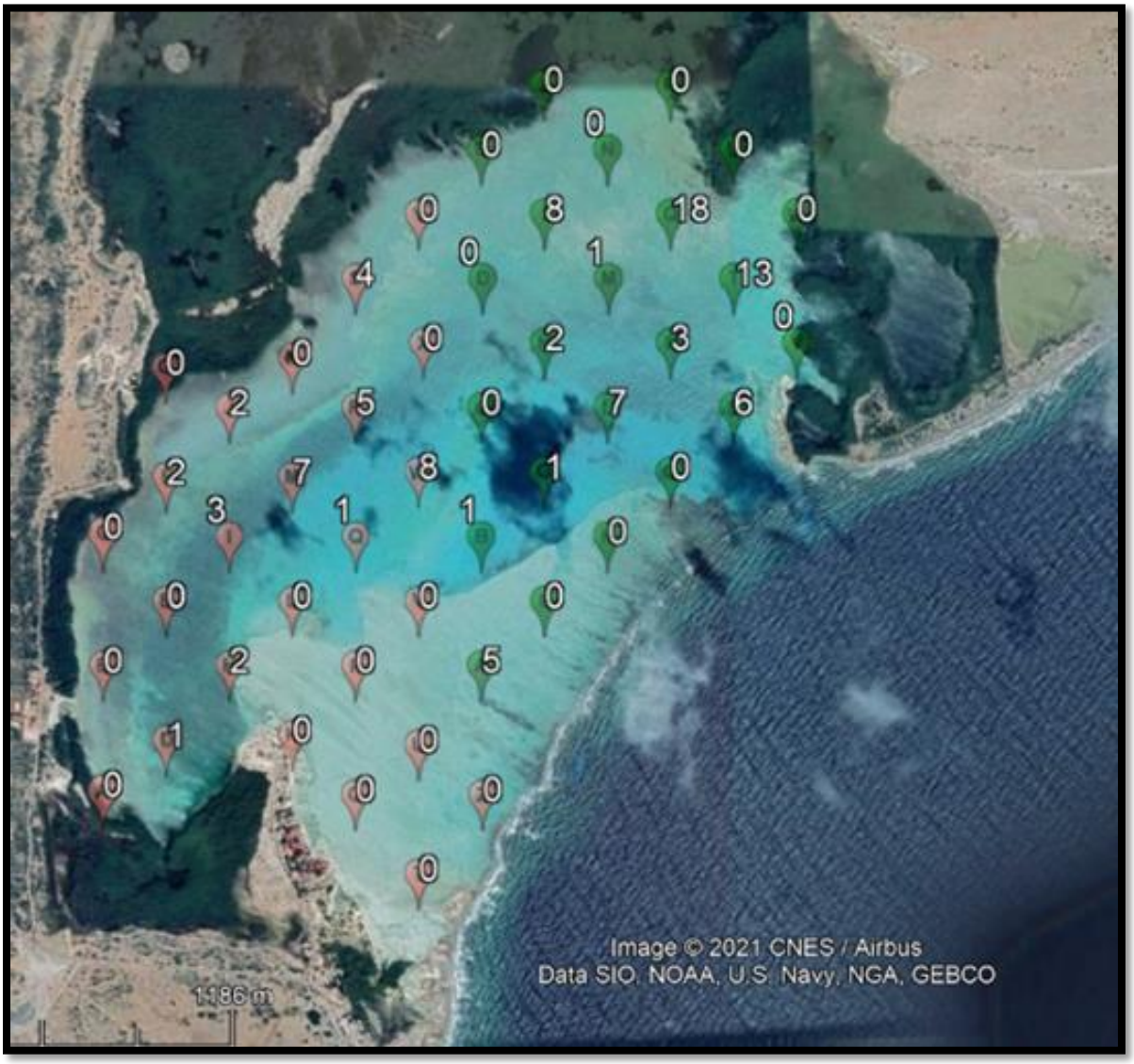

Figure 5: Map of Lac Bay, Red arrows represent A-Z, Green arrows represent Aa - Wa. Numbers represent the number of poached conchs found at each site.

Table 2: Number of poached conchs found during 2020 survey.

A	0
B	0
C	0
D	1
E	0
F	2
G	0
H	2
I	3
J	2
K	0
L	0
M	7
N	0
O	0
P	0
Q	1
R	5
S	4
T	0
U	0
V	0
W	8
X	0
Y	0
Z	0
Aa	**5**
Ba	1
Ca	0
Da	0
Ea	0
Fa	0
Ga	1
Ha	2
Ia	8
Ja	0
Ka	0
La	7
Ma	1
Na	0
Oa	0
Pa	3
Qa	18
Ra	0
Sa	6
Ta	13
Ua	0
Va	0
Wa	0
Total	100

In each quadrant recently poached conch were counted.

Recently poached shells can be distinguished from old poaching by examining the puncture hole, which is used to extract the meat. Recently poached shells have a clean puncture hole, with no algal growth.

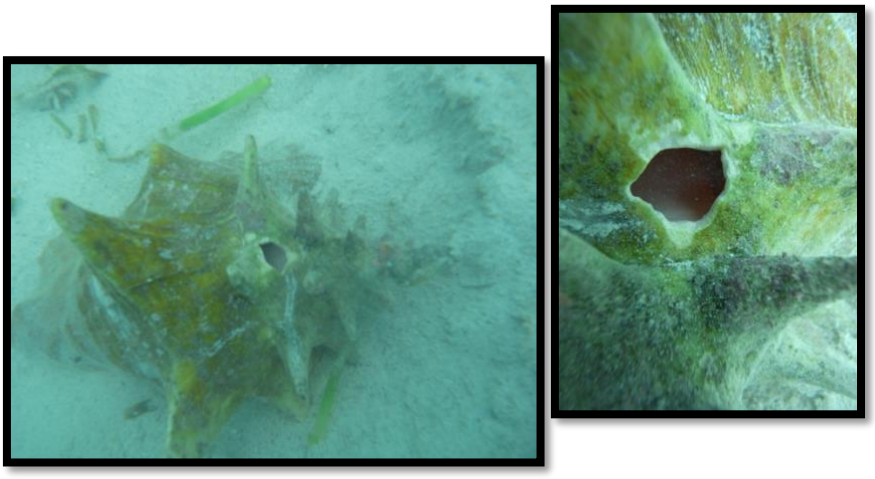

Figure 6: Recently poached shell, note the clean puncture hole, free of algal growth.

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