Report on Queen Conch (Lobatus gigas) Population Monitoring in Lac Bay 2022

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Internos

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This project was funded by Stinapa and executed by Stichting Internos. Field work was conducted by Daniela Simal and Ray van Dijk.

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1. Background

The queen conch, or *Lobatus gigas*, is an iconic species found within the Caribbean, being both economically and socially important. Famous for its unique and beautiful shell, along with its role as a popular item in local dishes, this species is heavily fished and, in some areas, highly threatened. A project started in the 1980's, Marcultura, worked to boost local populations by cultivating conch to be released in the bay (Hensen,1983). Unfortunately, there were no long-term positive impacts to the conch populations after this project.

Since November 1992, queen conch have 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 permits) are allowed. Unfortunately, poaching is still an ongoing issue for the island. The conch middens (old shells) that can be seen in large piles along the Lac Cai beach are from conch caught locally and brought in from the Aves Islands.

Other species in the genus *Lobatus* and *Strombus* are *Lobatus raninus (*hawkwing conch), *Lobatus costatus* (milk conch) and *Strombus pugilus (*fighting conch) also occur on Bonaire. *Lobatus costatus* are taken incidentally but their shell is very thick, and they have very little meat.

2. Previous Studies

A study conducted in 1969 by Hummelinck and Roos gave the first qualitative data for queen conch general distribution throughout Lac Bay. A study in 2000, by Cindy Lott, presented additional quantitative data within the same study area and 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, 2022). At the request of the fishermen organization Piskabon, a deep-sea survey was executed by the end of 2019 by WUR. The results have not been published yet.

3. Methodology

This survey was completed between December 2021 and February 2022. Throughout Lac Bay, 49 locations (Figure 1) were selected at regular intervals. Of these locations GPS coordinates were recorded for the corners of a 30 by 30 meter quadrant. Connecting the corners, 4 reel measuring tapes were laid out along the bottom to mark the outer periphery of the quadrant. The gps coordinates have been used in consecutive years since 2010.

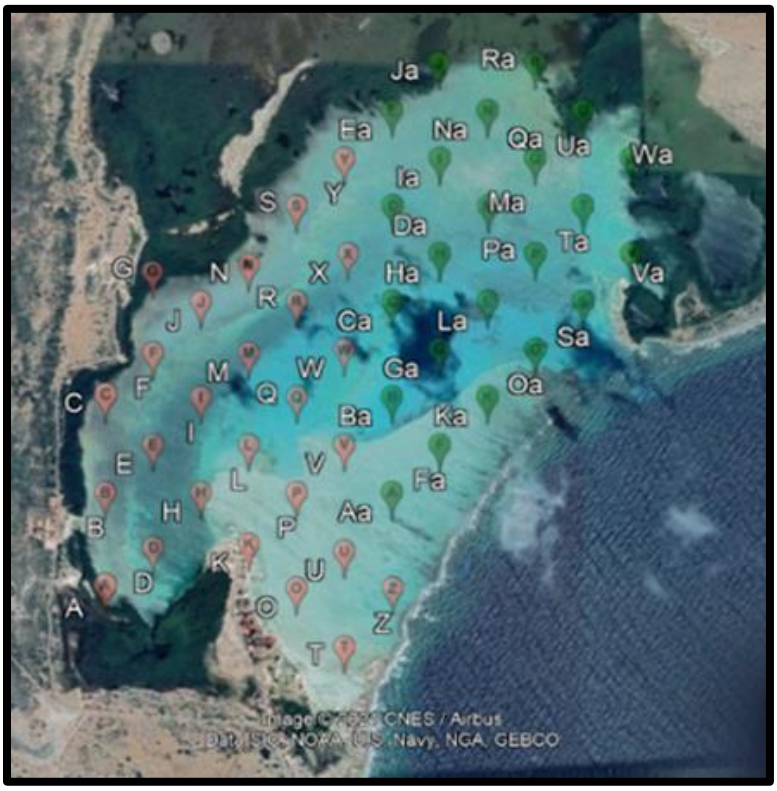

Figure 1: Map of 49 quadrants used during study

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.

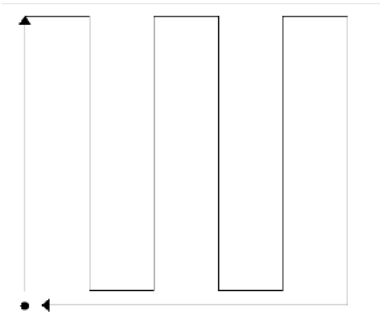

Figure 2: “U” pattern used during survey

During the survey, all live conch were collected and measured (total length and lip thickness). Figure 3 represents how lip thickness (left), and total length (right) were measured. Queen conch 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 conch per ha. This is an internationally accepted format given the Allee effect, which states that there is a correlation between population density and reproduction success (measured per capita) (Aranda et al., 2014).

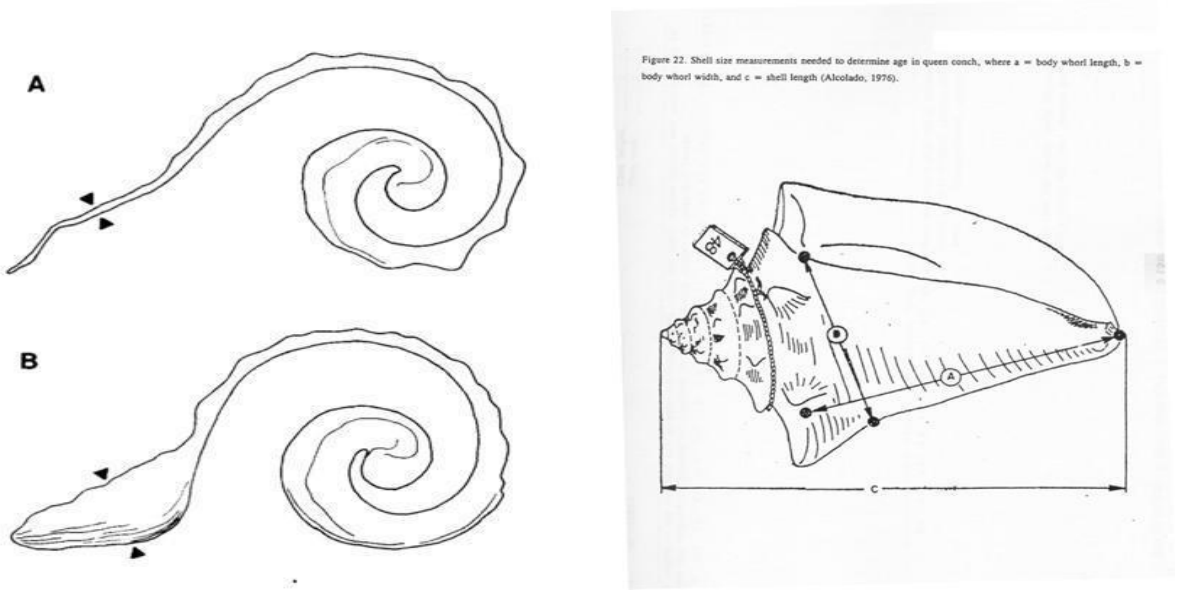

Figure 3: Diagram for measuring lip thickness (left) and total length (right)

4. Results

A total of 4.41 hectares was surveyed and **66 live conch** were found and measured. This resulted in a population density of **14.97 conch / ha**. To use the Allee effect, only sexually mature conch should be considered. Over the course of this study, **no sexually mature conch were found**, the oldest conch had a lip thickness which measured 8 mm. Figure 4 below shows a map of all conch documented during this survey. Please note that the red pins represent A-Z, and the green pins represent Aa – Wa. Numbers next to the pins represent the number of live conch found at each site.

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

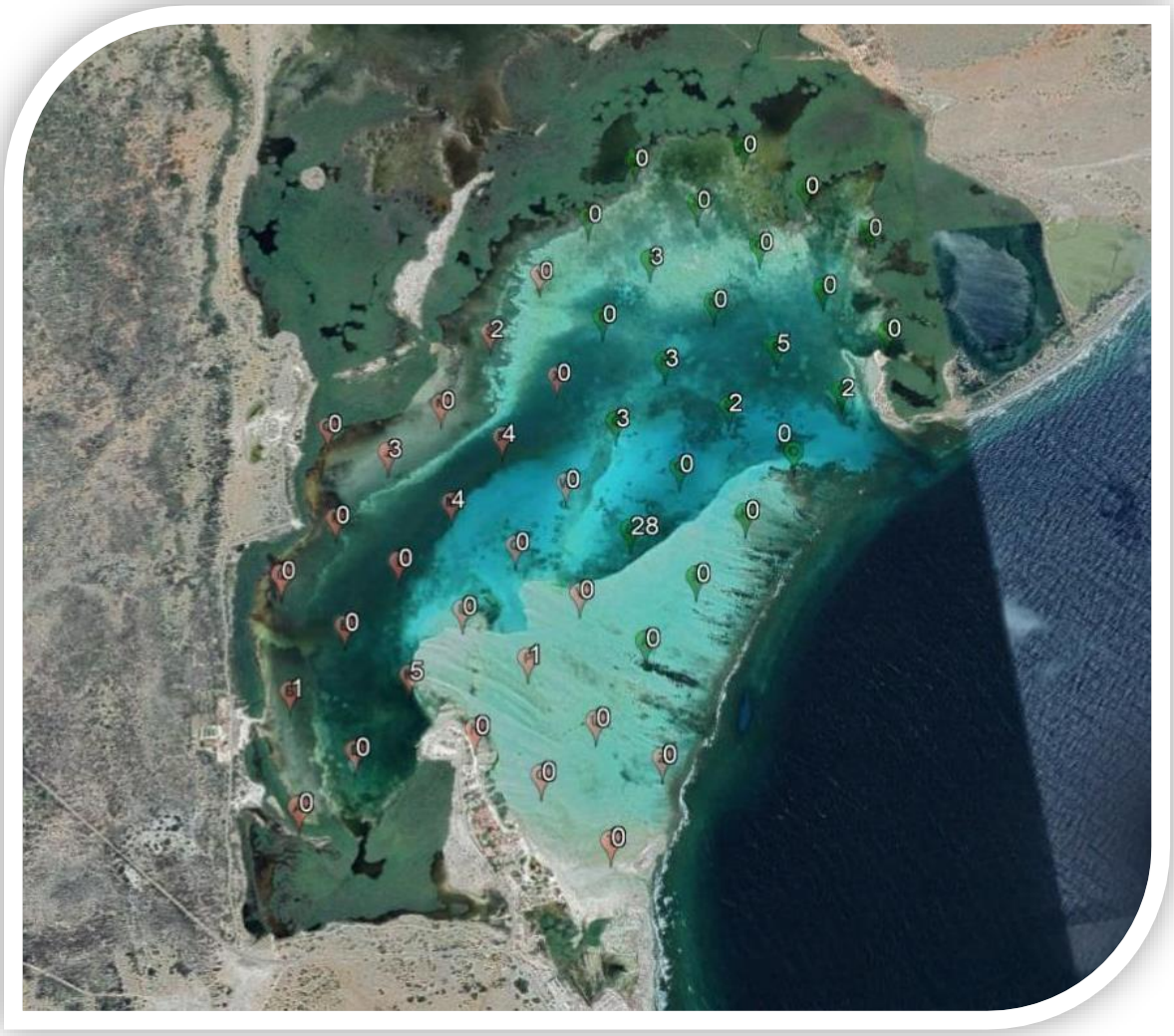

Figure 4: Map of Lac Bay, Red pins represent A-Z, Green pins represent Aa - Wa. Numbers represent the number of live conch found at each site.

Poached conch have also been noted with 14 recently poached conch and over 100 somewhat older were found within the same quadrats. In addition, 10 conch preyed by octopus were found in quadrant M.

In addition to empty poached shells below the surface, there have been incidents of poached shells being dumped on shore. Recently, there have been repeated reports of poachers dumping empty shells at Sorobon. The increasing pile there is testimony of poaching activity and can be seen in Figure 5 below.

Figure 5: Recently poached conch shells left in a pile at Sorobon

Table 1, below, has been included to summarize the results of the last 6 surveys (2010, 2013, 2015, 2016, 2020, 2022). The results of the 2022 survey highlight a significant issue with only 66 conch found, none of which having reached sexual maturity.

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

2010 (6.35 conch/ha), 2013 (51.70 conch/ha), 2015 (46.49 conch/ha), 2016 (21.54 conch/ha), 2020 (19.27 conch/ha), 2022 (14.97 conch/ha).

Table 1: Summary of Conch Surveys since 2010

	2010	2013	2015	2016	2020	2022
A	0	0	0	0	0	0
B	1	1	0	2	3	1
C	3	1	0	0	2	0
D	0	0	0	0	0	0
E	2	0	1	0	0	0
F	0	3	1	2	1	0
G	0	0	1	0	1	0
H	0	3	2	1	3	5
I	1	8	9	6	10	0
J	2	0	0	0	3	3
K	0	17	0	3	0	0
L	1	12	0	0	0	0
M	4	18	6	1	5	4
N	4	2	0	1	1	0
O	0	1	0	1	0	0
P	0	0	0	0	0	1
Q	0	7	7	1	1	0
R	0	5	0	1	4	4
S	0	0	9	4	3	2
T	0	3	0	1	0	0
U	0	0	0	0	0	0
V	0	8	1	1	0	0
W	3	0	0	0	0	0
X	0	2	1	0	0	0
Y	0	0	2	0	0	0
Z	0	0	0	0	0	0
AA	0	8	1	6	2	0
BA	1	4	66	6	1	28
CA	0	22	2	1	0	3
DA	0	4	0	0	1	0
EA	0	0	0	0	0	0
FA	1	7	2	3	5	0
GA	1	0	55	8	5	0
HA	0	12	4	0	4	3
IA	1	2	0	9	19	3
JA	0	0	0	0	0	0
KA	0	3	0	2	1	0
LA	0	1	1	21	0	2
MA	0	1	0	0	0	0
NA	0	0	0	0	1	0
OA	0	0	0	0	0	0
PA	0	15	5	9	2	5
QA	1	2	16	3	1	0
RA	0	0	0	0	0	0
SA	1	55	7	0	2	2
TA	1	1	6	2	4	0
UA	0	0	0	0	0	0
VA	0	0	0	0	0	0
WA	0	0	0	0	0	0
TOTAL	28	228	205	95	85	66

5. Discussion and recommendations

Distribution of conch throughout the bay is not consistent, and probably more a function of fishing pressure than of environmental conditions.

Juvenile conch primarily feed on seagrass detritus, red and green macroalgae, organic material within the sediment and cyanobacteria (Randall, 1964; Stoner & Sandt, 1991; Stoner & Waite, 1991; Serviere-Zaragosa et al., 2009; Stoner et al., 1995). In recent years, invasive seagrasses are becoming much more common within Lac Bay shifting both food availability as well as the level of protection for juvenile conch. Invasive seagrasses have been known to be much denser, covering most of the sandy bottom leaving little room for conch to graze (van Tussenbroek et al., 2016). In addition, this dense coverage also limits the amount of light reaching the sediment, further reducing productivity of species within the sand (Hill, 1996; Yang & Flower, 2012). Lastly, some research has even indicated that these invasive seagrass species have lower nutrient value and can contribute to slower development in juvenile conch (Bowmen et al., 2019, Christianen et al., 2019).

Sargassum influxes could also greatly impact the remaining conch populations. As the sargassum sinks and decays, it smothers benthic life, both physically harming conch and its food supply. Long-term effects are also seen through eutrophication of the water, lowering water quality such that conch are unable to return after significant sargassum events.

It is interesting to note the dramatic increase between conch populations in 2010 and 2013, and then the rapid decrease after 2015. This is likely a result of the daily presence of STINAPA on the open waters during this period, executing the conch restoration program. This may also be attributed to the education and outreach component of the conch restoration project. At the end of the project everybody on island was aware of the protection status of the conch, but support for enforcement was very low and poaching was (and still is) done quite openly (pers. comm. Stinapa Ranger Sarpong). A future project, RESEMBID, will include designated rangers for Lac to help improve enforcement. This increased presence of enforcement authorities in combination with enforcement in the restaurant (snack) sector may have more positive effects.

One final recommendation is to design and execute a dedicated conch monitoring strategy. Protecting the queen conch species in Lac Bay is applicable to meeting goals of the natuurplan 2020-2024, preserving biodiversity in the Nature and Environmental Policy Plan and can be listed in additional reporting documents such as the state of nature report, as well as in Ramsar, CITES, and the Convention of Biological Diversity status reports, just to name a few.

The queen conch is an iconic species for Bonaire which should be protected. Improving water conditions which favor native seagrass as well as rapid removal of sargassum to minimize risk of smothering or deteriorating water quality are vital to the health of conch. Lastly, improved enforcement to lower poaching pressures will hopefully give the queen conch a chance to repopulate the bay to its former numbers.

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