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**“Seizing the trade and business potential of Blue BioTrade products for promoting sustainable livelihoods and conservation of marine diversity in selected Organisation of Eastern Caribbean States (OECS) countries Project”
(UNCTAD-OECS Blue BioTrade project)**

Presentation of Results of Grenada Queen Conch Stock Assessment and Recommendations

Teams Virtual Meeting

2 December 2022



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Grenada Queen Conch Stock Assessment Results and Recommendations

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Goal of queen conch stock assessment

To assess the Queen Conch (*Strombus gigas*) population at two fishing areas in Grenada and estimate the potential yield of the resource.



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Objectives of queen conch stock assessment

Determine the following:

1. Population structure per Fishing area
2. National population structure
3. Density per fishing area
4. Legal size density
5. Abundance per fishing area
6. National biomass (lbs)
7. National abundance
8. Maximum Sustainable Yield (MSY)
9. Relative age population structure
10. Total Allowable Catch (TAC).



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Study area



Carriacou

Caliste

Adobe Stock | #85744459



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Determination of potential queen conch habitat / fishing areas.

- Interview fishers, NGOs, Conservation organizations, etc.
- Gather information from staff of Grenada Fisheries Division.
- Ground truthing.
- Use data from other queen conch surveys.



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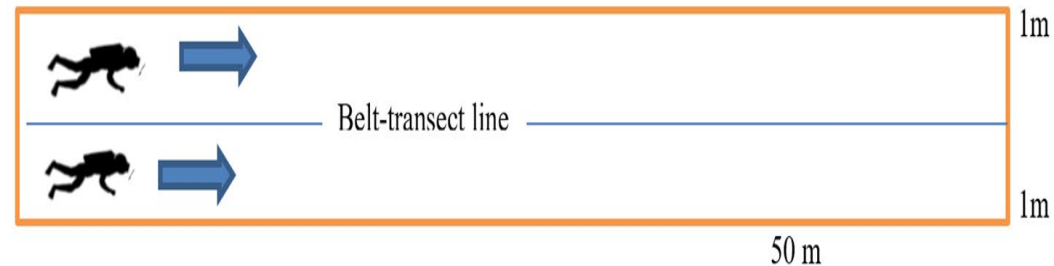
Sampling unit

- Belt transect: 50 m x 2 m.
- Placed randomly at identified queen conch habitats / fishing grounds with the assistance of GFS staff or fisher divers.

Materials and methods

Sampling method

- Two persons normally dive/snorkel along the belt transect at approximately 1 m away from the belt.
- Each transect is recorded using a hand-held GPS.
- Each conch found along the transect is counted and morphometric measurements are recorded.



Queen conch survey using belt transects.



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Queen conch survey data sets

- A. Number of queen conch found in belt-transects.
- B. Shell length (LTH) (tip of the spire to the siphonal canal) will be measured to the nearest millimeter using a measuring board.
- C. The shell lip thickness (LIP) (mid-lateral region on the lip side of the shell approximately 40 mm in from the edge of the shell) will be measured to the nearest 0.1 mm using Vernier caliper.
- D. Habitat type: sea grass, sand & sea grass, coral, hard bottom, etc



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Field data collection sheet

Grenada Fisheries Division

Queen Conch Underwater Survey Data Collection Sheet 2022

Date: _____ Sampling station: _____ Transect No. _____ Sheet No. _____

Team members: _____ Transect length & width (m): _____

Start GPS Coordinates :16Q					UTM:				
End GPS Coordinates:16Q					UTM:				
No.	Depth (ft)	Shell Length (mm)	Lip Thickness (mm)	Comments and habitat type (note if conch has egg mass or are mating)	No.	Depth (ft)	Shell Length (mm)	Lip Thickness (mm)	Comments and habitat type (note if conch has egg mass or are mating)

A - Algae	C - Coral	CR- Coral Rubble	M - mud	PR – Patch Reef	S - sand	Sl - silt	Sg- sea grass	DnSg – dense Sea grass	SpSg – sparse Sea grass
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Preparation for field work

Training workshop

- Theoretical/practical sessions to train the fishers and staff of the Grenada Fisheries Division on the survey method
- Logistics/planning session
- Exchange of experience and local knowledge to improve identification of queen conch habitats/fishing areas
- Data quality and management



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Actual field work

- Practical field work done during Oct. 18-22, 2022.
- 2 teams participate (min. of two persons per team).





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Caliste queen conch fishing grounds (red colored rectangles) superimposed on a Google Earth Pro map.



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Carriacou queen conch fishing grounds (red colored rectangles) superimposed on a Google Earth Pro map.



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Grenada QC stock assessment - key findings

1. A total of 250 queen conch were found and measured in a total area of 1,100 m² (using underwater belt transects each measuring 50 x 2 m) in 2 primary fishing grounds (Caliste and Carriacou).
2. A density of 194 conchs and 255 conchs per hectare were found in Caliste and Carriacou, respectively.
3. In both study areas, primarily very mature adult conch was found. Very few juvenile and sub-adult conch was found.



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Grenada QC stock assessment - key findings

1. In the Caliste, the area of distribution of queen conch was estimated at 1,748 hectares while in Carriacou the area was estimated at 3,843 hectares.
2. Queen conch abundance in Caliste is estimated 339,312 individuals while in Carriacou the abundance was 974,865 individuals giving an estimated biomass available to the fishery of 169,556 lbs and 487,433 lbs, respectively.
3. The mean shell length in Caliste was estimated at 21.7 cm and mean shell lip thickness was 16.7 mm. Animals measuring 21 to 25 cm in shell length composed 87.63 % of the population.
4. The mean shell length in Carriacou was estimated at 21.5 cm and mean shell lip thickness was 15 mm. Animals measuring 20 to 25 cm in shell length composed 85.6% of the population.



Summary statistics for qc shell length in Caliste

Mean	21.65979
Standard Error	0.256884
Median	22.2
Mode	22.3
Standard Deviation	2.530014
Sample Variance	6.400971
Kurtosis	3.41084
Skewness	-1.67893
Range	13.7
Minimum	13
Maximum	26.7
Sum	2101
Count	97
Largest(1)	26.7
Smallest(1)	13
Confidence Level(95.0%)	0.509911

Summary statistics for qc shell lip thickness Caliste

Mean	16.67113
Standard Error	0.651446
Median	18
Mode	17
Standard Deviation	6.415995
Sample Variance	41.16499
Kurtosis	0.744706
Skewness	-1.00804
Range	27
Minimum	2
Maximum	29
Sum	1617.1
Count	97
Largest(1)	29
Smallest(1)	2
Confidence Level(95.0%)	1.293109



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Summary statistics for qc shell length in Carriacou

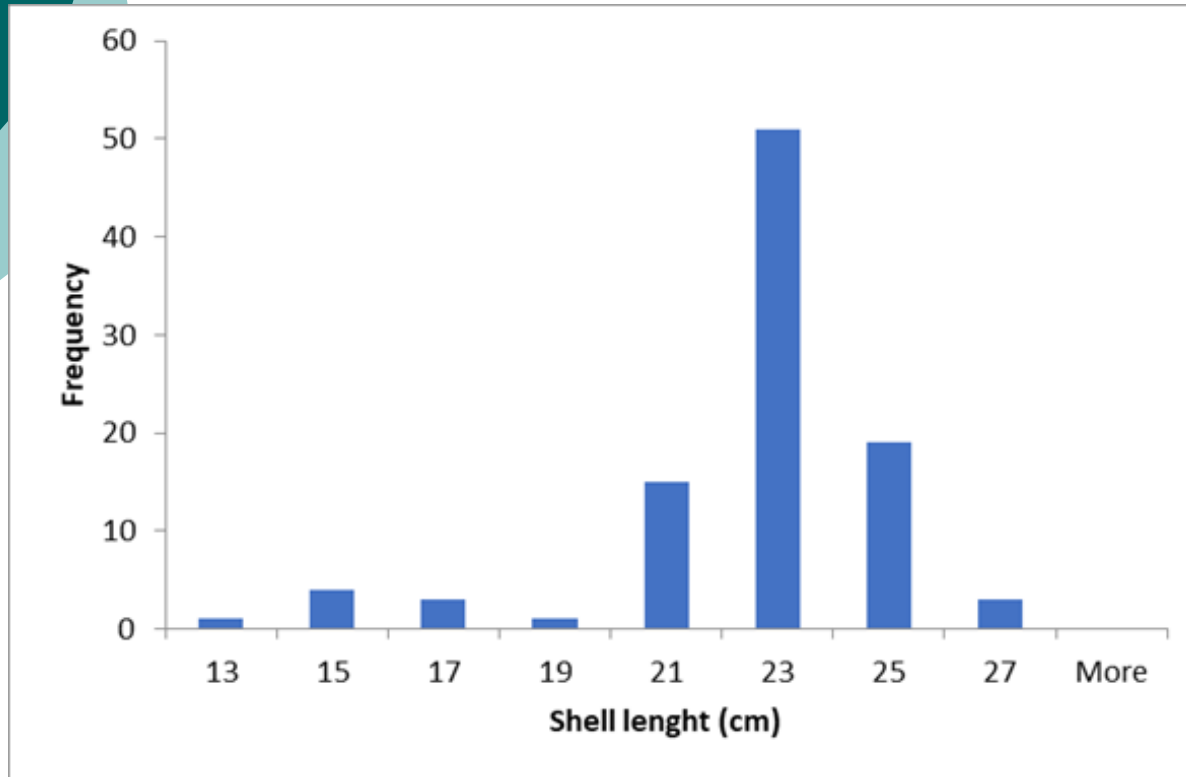
Mean	21.49673
Standard Error	0.271895
Median	21.5
Mode	22
Standard Deviation	3.36316
Sample Variance	11.31084
Kurtosis	3.683688
Skewness	-0.57128
Range	25
Minimum	9
Maximum	34
Sum	3289
Count	153
Largest(1)	34
Smallest(1)	9
Confidence Level(95.0%)	0.537182017

Summary statistics for qc shell length in Carriacou

Mean	15.03267974
Standard Error	0.653732786
Median	16
Mode	12
Standard Deviation	8.086227977
Sample Variance	65.3870829
Kurtosis	-1.094851653
Skewness	0.0600198
Range	32
Minimum	2
Maximum	34
Sum	2300
Count	153
Largest(1)	34
Smallest(1)	2
Confidence Level(95.0%)	1.291575895



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<i>Bin</i>	<i>Frequency</i>	<i>Cumulative %</i>
13	1	1.03%
15	4	5.15%
17	3	8.25%
19	1	9.28%
21	15	24.74%
23	51	77.32%
25	19	96.91%
27	3	100.00%

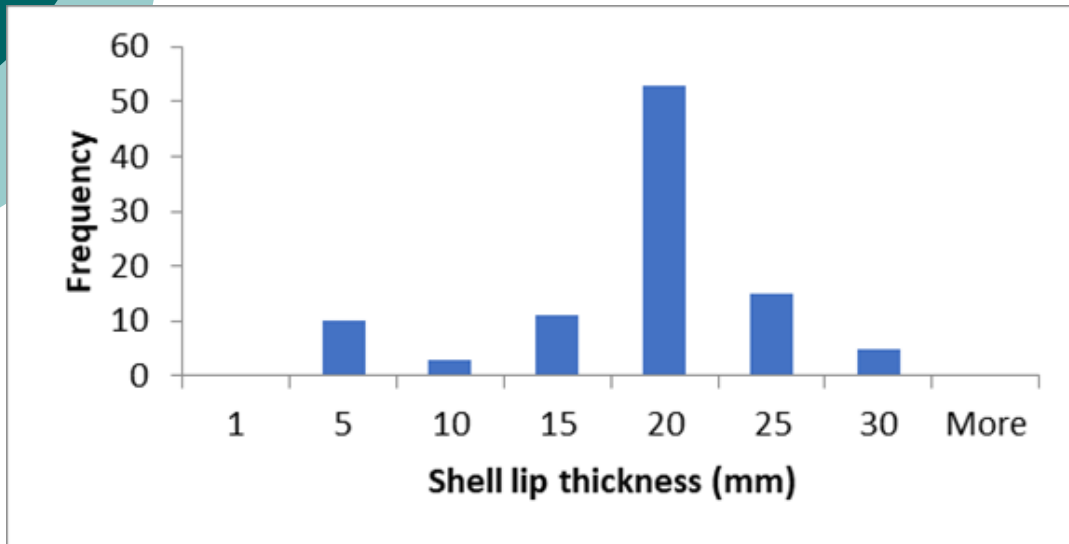
Queen conch shell length frequency distribution in Caliste



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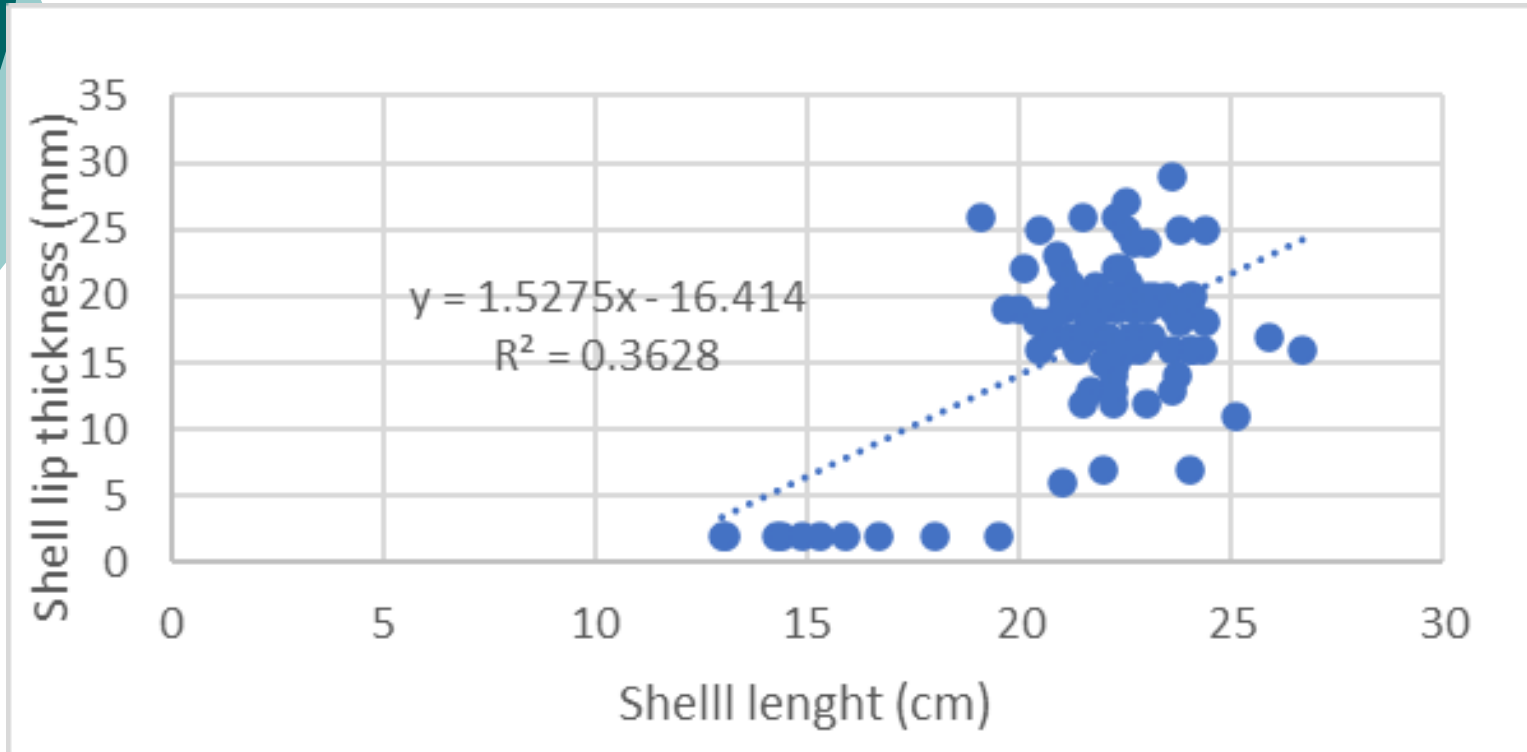


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<i>Bin</i>	<i>Frequency</i>	<i>Cumulative %</i>
1	0	0.00%
5	10	10.31%
10	3	13.40%
15	11	24.74%
20	53	79.38%
25	15	94.85%
30	5	100.00%

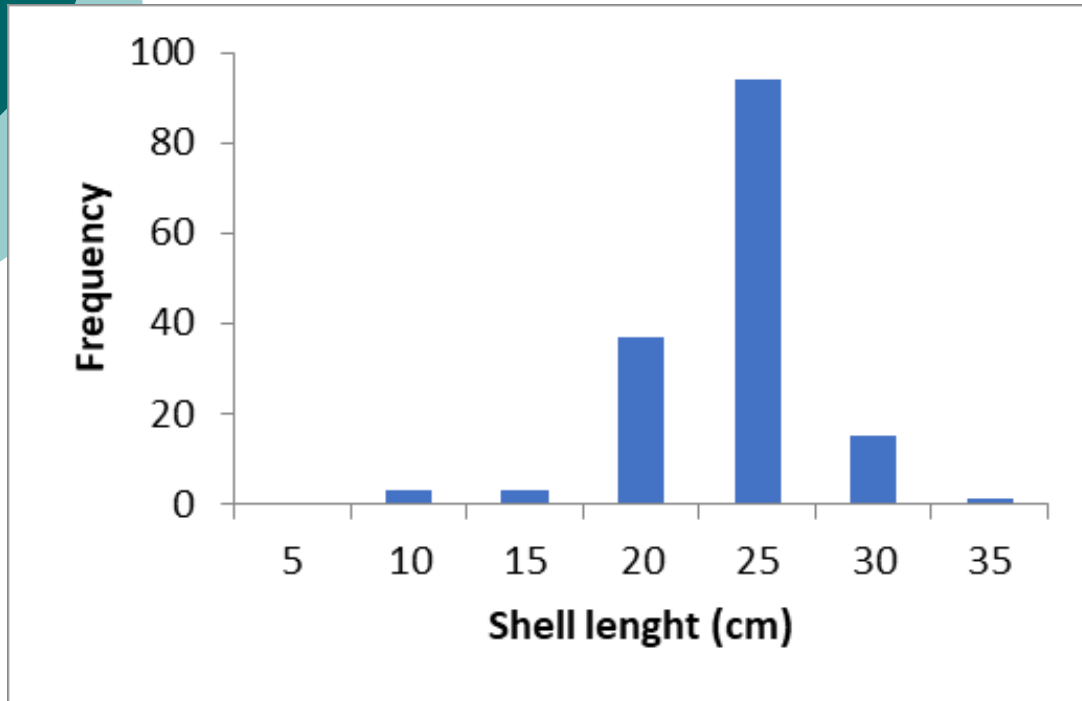
Queen conch shell lip thickness frequency distribution in Caliste



Linear relationship between queen conch shell length and lip thickness in Caliste



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<i>Bin</i>	<i>Frequency</i>	<i>Cumulative %</i>
5	0	0.00%
10	3	1.96%
15	3	3.92%
20	37	28.10%
25	94	89.54%
30	15	99.35%
35	1	100.00%

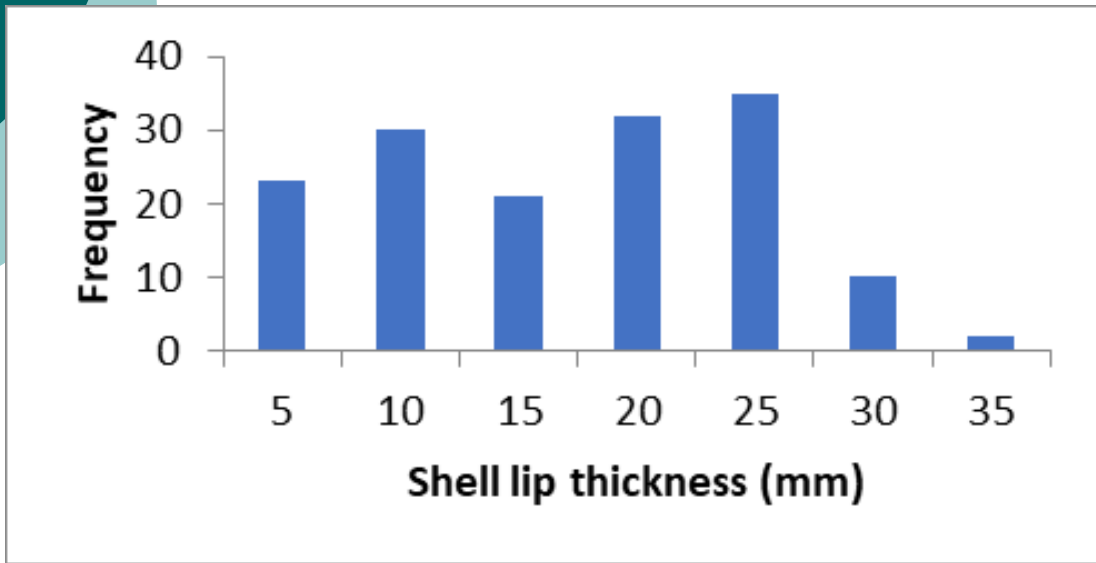
Queen shell length frequency distribution in Carriacou



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<i>Bin</i>	<i>Frequency</i>	<i>Cumulative %</i>
5	23	15.03%
10	30	34.64%
15	21	48.37%
20	32	69.28%
25	35	92.16%
30	10	98.69%
35	2	100.00%

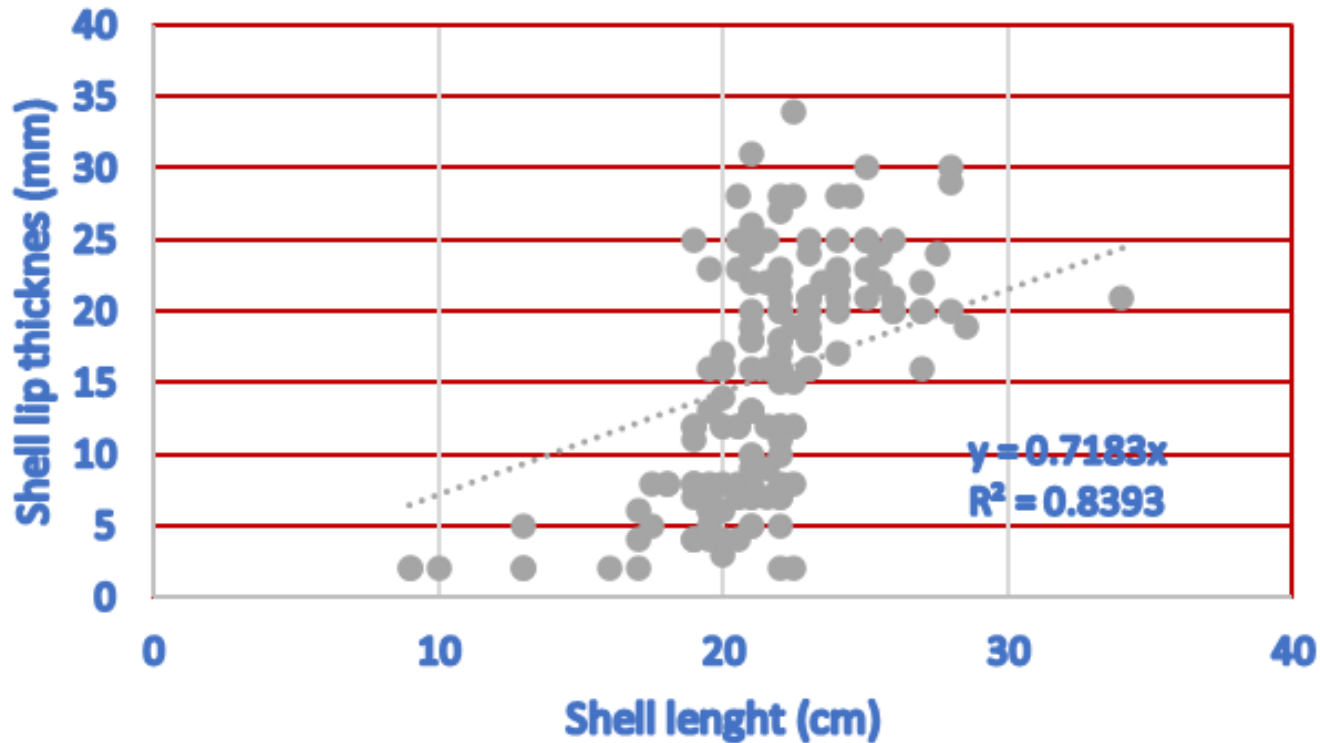
Queen conch shell lip thickness frequency distribution for Carriacou



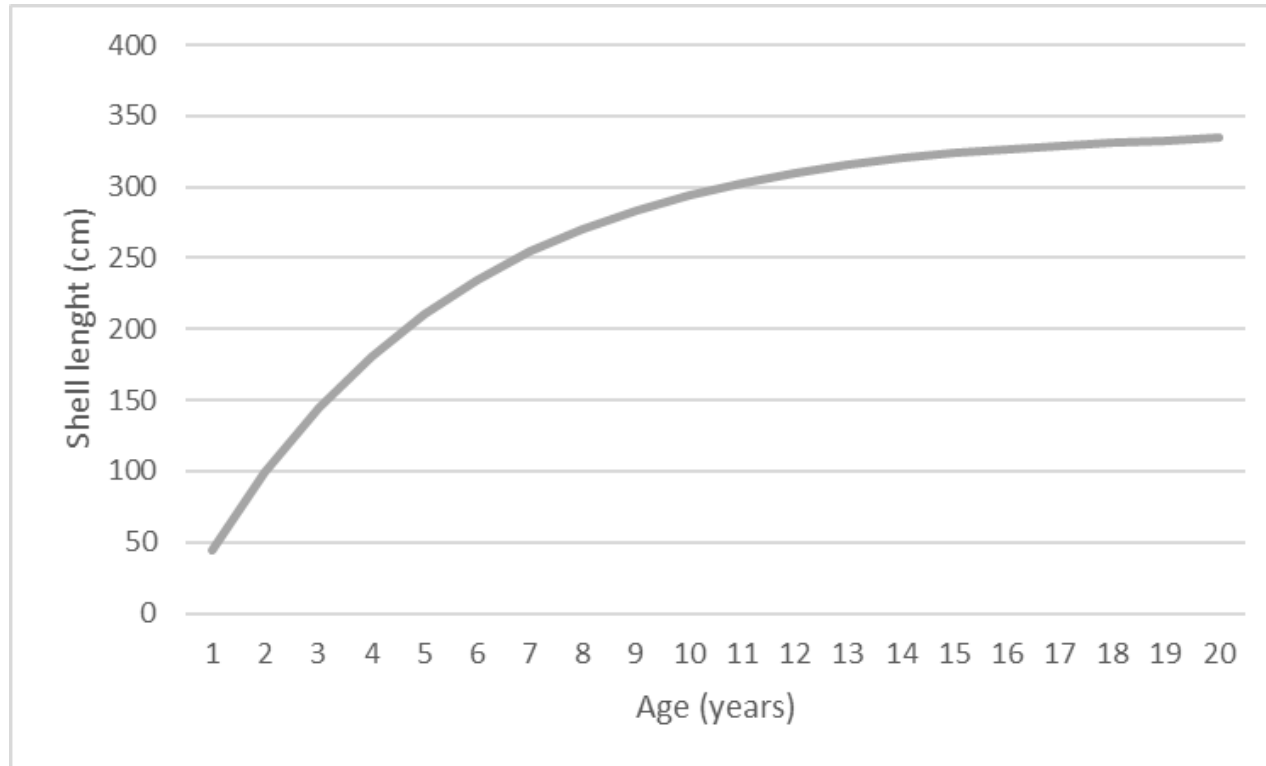
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Linear relationship between the queen conch shell length and shell lip thickness in Carriacou.



k	0.207
to	0.33

Grenada queen conch shell length - age relationship



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Estimate of queen conch biomass per fishing area

Caliste

Density per Ha	Area of distribution	Abundance	Weight of ind. Conch (onz)	Biomass (onz)	Biomass (lb)
194	1748	339112	8	2712896	169,556

Carriacou

Density per Ha	Area of distribution (ha)	Abundance	Weight of ind. Conch (onz)	Biomass (onz)	Biomass (lb)
255	3823	974865	8	7798920	487,433



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Main conclusions

1. The queen conch population of Grenada is considered healthy.
2. The bulk of the population (85%) is composed of animals measuring 20 to 25 cm in shell length and 15 mm in shell lip thickness.
3. The queen conch density is well above the 86 conch per hectare recommended by CITES and is higher than the 100-adult conch per hectare that NOAA of the US government is currently using as a criterion needed for successful reproduction and viability of the queen conch.
4. In both study areas, the shell length and lip thickness are very similar suggesting that it is a single population.



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Main conclusions

5. The queen conch shells in Caliste are older and easier to “knock” than in Carriacou.
6. In both study areas, the queen conch is very mature and adult individuals are referred as “mega spawners”.
7. Overfishing of these very mature individuals can result in the rapid decline of the health and reproductive capacity of the population.
8. Extreme caution should be exercised in the harvest of mega spawners.
9. Current fishing effort being applied to the fishery is not considered high (considering fishers’ knowledge and experience of the fishery) and should be maintained as low as possible.
10. The queen conch meat did not show any distinguishing characteristics that would indicate an inferior meat quality.



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Recommendations

To: Fisheries Authority

1. The abundance of queen conch in Grenada can support a fishery directed for the export market and to ensure good management and conservation of queen conch population, stock assessments should be carried out at least every 2 years.
2. The licensing of fishers and fishing vessels is strongly advised to comply with CITES requirements.
3. A national queen conch stock assessment report that is to be produced should be endorsed by the Grenada FD and submitted to CITES to support the implementation of a national catch quota - for export of qc meat to foreign markets.
4. A precautionary Total Allowable Catch limit of 558,440 lbs of conch meat (85% of 656,989 lbs) is recommended.



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Recommendations

To: CITES Management Authority

1. To develop and pass into law a national CITES legislation
2. To prepare outstanding national annual CITES reports (2016 – 2021) and submit to CITES as a priority



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Queen conch Performance Indicators and Reference Points

Performance Indicator	Target Reference Point	Limit Reference Point	Data Stream
Average shell length	Running 10-year average	Shell Length _{limit} ≤ 0.94 Shell Length _{target}	National underwater visual survey
Conch density (total individuals/Ha) of legal and sublegal individuals in suitable conch habitat	Running 10-year average	88 conch/ha to meet the CITES requirement	National underwater visual survey
Total landings from previous year	Running 10-year average	Catch _{limit} ≤ 0.75 Catch _{target}	Cooperative data
To include in the next iteration of the conch FMP			
Legal/sub-legal	Running 10-year average		National underwater visual survey

Midseason Conch Reference Points

Total early-season catch (first 3-months)	Running 10-year average	Catch _{limit} < 0.9 Catch _{target}	Cooperative data
Median early-season CPUE (first 3-months)	Running 10-year average	CPUE _{limit} < 0.9 CPUE _{target}	Cooperative data



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Thank you