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STANDARD OPERATING PROCEDURE (SOP) FOR JUVENILE QUEEN CONCH SURVEY ALONG COASTAL WATERS IN ACCORDANCE WITH THE BELT TRANSECT METHOD

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1. INTRODUCTION

This document sets out the standard operating procedure (SOP) for the execution of juvenile queen conch surveys along the coastal waters, in accordance with the belt transect method.

Background

In the Caribbean region, queen conch is a vital livelihood and cultural staple. It supports artisanal fisheries, sustains coastal incomes, anchors seafood cuisine, and feeds export markets. Its presence also signals healthy seagrass beds, while overharvesting threatens both ecology and economy. Thus, conserving conch means safeguarding tradition, biodiversity, and food security all at once. In conch resource management, conserving juveniles is crucial, but standardized surveys of juvenile distribution and density have not been established. On another front, the belt transect method is a widely used field survey technique in coastal ecosystem research, particularly for studying the distribution, abundance, and diversity of organisms (e.g., corals, seagrasses, macroalgae, benthic invertebrates) along a defined area. Therefore, a juvenile conch distribution survey was conducted under the COASTFISH project using the belt transect method, and a standardized survey protocol was developed as follows.

2. OBJECTIVE

Estimate the density, size structure, and habitat associations of juvenile conch within defined coastal strata (e.g., depth bands, habitat types).

3. DEFINITION OF JUVENILE CONCH

The juvenile queen conch shells surveyed were those with a shell length of less than 150 mm, and adult shells were defined as those with a shell length of 150 mm or more.

4. SAFETY & ETHICS

Team:	Minimum 3 people (1 navigator/recorder + 2 observers).
Entry mode:	Snorkelling (≤ 5 m) or SCUBA (deeper). Follow local diving and boating rules.
Permits:	Confirm research permits, species protection rules, and handling restrictions.
Environment:	Maintain neutral buoyancy for avoiding trampling coral, seagrass and sensitive epifauna.

5. EQUIPMENT

Marker buoys/anchors (small sand screws or weights) and line:	Used to measure the starting and ending points of the belt transect survey.
30–50 m fiberglass tape or transect reel (meter-marked):	If the transect line is short, this tape can be laid and surveyed along it.
Waterproof data sheets (slate/pencils):	Used by survey divers to record survey results underwater as needed.
Underwater camera/video:	Used to photograph and record underwater conditions as needed.
Calipers / tailor's tape (mm):	Used to measure the shell length of conch found.
Handheld GPS device:	Used to measure the starting and ending points of the belt transect survey.

6. SURVEY DESIGN

Stratification: Identify the depth range (e.g., 0-5 m, 5-10 m) and bottom type (e.g., seagrass area, patchy seagrass, sandy bottom) of the survey area.

Transect length: Typically, 10 - 50 m. Keep the transect length constant within a layer. However, if the distribution of juvenile conch is scarce, the transect length must be longer. In this case, since physically placing a measuring tape is impractical, measure the start and end points of the transect with a GPS device and calculate the transect length using GIS software (e.g., Google Earth) after the survey is completed. In this case, the survey time for each transect will be fixed (e.g., 30 minutes).

Belt width: A total of 1-2 m (i.e., 0.5-1 m on both sides of the line). Use a measuring pole/rope to maintain the width. It is also possible to record the survey diver's outstretched arm length in advance and use this as an alternative to a measuring pole.

Repetition: Set up at least three transects per layer (five or more if possible) for each survey round. Transects should be randomly placed and at least 10 m apart from other transects.

Seasonal: Preferably repeated within the same month/season to track trends.

7. FIELD PROCEDURE (PER TRANSECT)

1. The research vessel deploys a weighted buoy at the starting point and records the GPS coordinates of that point.

2. At the starting point, divers confirm the distance and depth within the visible range.

3. From the starting point, a survey line is deployed along a fixed direction.

   If the distribution density is low, it is better to stop deploying lateral lines and begin the survey from the starting point, heading in a fixed direction using an underwater compass, in order to expand the survey area, as following figure.

4. During the survey, divers observe and collect conch within a 3 m range (1.5 m on either side of them) and record the water depth and bottom sediment at that location.

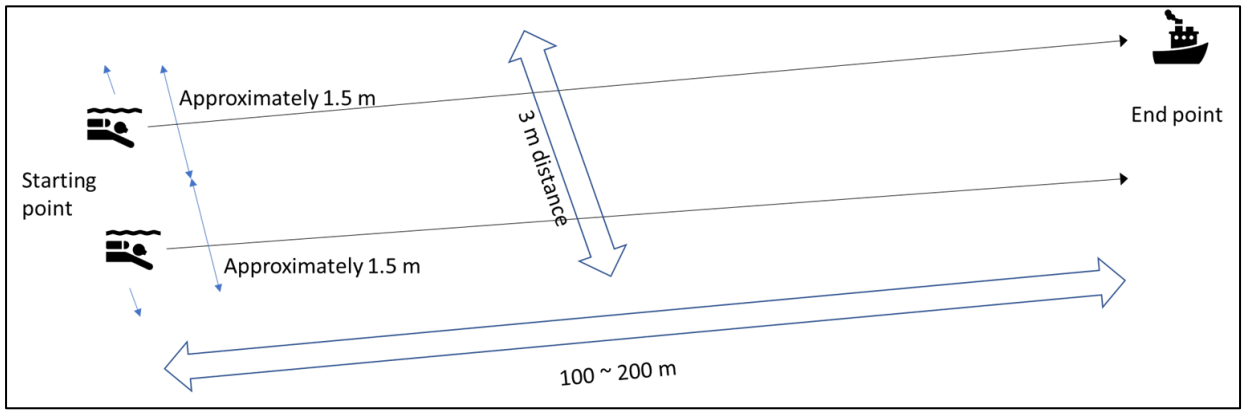
5. Divers continue the survey to the end point. If no physical lateral lines are used, the survey ends

after a predetermined time (e.g., 30 minutes) by deploying a marker buoy.

6. The research vessel records the GPS coordinates of the marker buoy's location as the end point.

7. On the research vessel, the types of specimens collected during each dive are identified and their shell length and width are measured and recorded.

Juvenile conch on the seabed



Schematic diagram of expanding the survey area of the belt transect on low distribution density of conch

8. Once the collected specimens have been measured and identified, the conch shells are returned to the area.

9. Repeat the survey on other transects.

8. DATA TO RECORD (MINIMUM)

- Project/site, date/time, team, transect ID, length (m), width (m), depth (m), visibility (m), tide/current, GPS start/end, habitat notes.

Shell length measurement of observed conch

- Juvenile count (total and by segment), shell lengths (subset or all), method (visual/probe), buried detected (Y/N).

9. CALCULATIONS

Area surveyed (A): $A\ (m^2) = L \times W$

Density (per m²): $D = n / A$, where n = juvenile count

Density (per ha): $D_{ha} = n / A \times 10{,}000$

Stratum mean & standard deviation (S.D.): Compute mean density across transects within each stratum ± S.D.

By collecting and analysing data as described above, we can compare changes over time at different locations or at the same location

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