

Evaluating the population of the hawksbill turtle (*Eretmochelys imbricata*) in the Blue Bay Marine Protected Area, Republic of Mauritius.

Chumun, P.; V. Seetapah; H. Jhumun; S. Perrine

The Hawksbill turtles are critically endangered and face the possibility of drastic population drop worldwide which could lead to regional extinction of the species. Population estimation of the hawksbill turtle, like other marine turtles, are largely estimated through nesting females. The species as for its other marine turtles' counterparts, has been actively hunted for its meat and shell prized as ornaments. Whilst commercialisation of hawksbill turtle has decline globally, the species still shows difficulty in recovery due mostly anthropogenic factors that have destroyed most of its foraging and nesting sites. Despite the knowledge of the prevalence of hawksbill turtles in coastal waters of Mauritius, confirming their population status has proven difficult due to the lack of nesting attempts. In this context an in-water monitoring programme was developed to determine the fluctuation of the population of hawksbill turtle within the Blue Bay Marine Protected Area (BBMPA). The monitoring was initially done due to several accounts of resident hawksbill turtle in the marine park. Through the use of the photo-identification method, the degree the of residency and gender of these individual turtles was determined as well as the nature of the usage of BBMPA for these individuals. After 10 months of monitoring, the output results proved that the marine park, despite a relatively small size, had harboured a total of 25 turtles, quarter of which were identified as juveniles and the rest were assumed females. Each turtle spent various amount of time in the BBMPA with one individual present in all the months of monitoring and some individuals observed only for 1 outing. Behavioural observations demonstrate high foraging activity, mostly centred around coral rubble. Whilst this study is still at the preliminary stage, the density of hawksbill turtle suggests that the area of focus sustains a substantial population of turtles. Further comparison with previous studies may suggest through foraging behaviour that the females may be stocking upon calcium carbonate (coral rubble) for possible independent nesting attempts.

Introduction

There are currently two species of marine turtle that are frequently observed around Mauritius, *Eretmochelys imbricata* (Hawksbill Turtle) and *Chelonia mydas* (Green Turtle). Sightings of both species have been reported by local skippers within Blue Bay Marine Protected Area, established in 1997 and covers an area of approximately 3.53 Km².with however a net dominance of critically endangered hawksbill turtle. *E. imbricata* are one of the smaller species of marine turtle and migrate to nest, reproduce and forage in single locations. Megafauna, such as sea turtles are key contributors to local ecosystems and so it is important to understand their habits in order to better protect them. In this context, we developed a monitoring study to understand the dynamics of the turtles within the park boundaries.

The objective of the study was to;

1. Confirm the presence of a resident population of *E. imbricata* or *C. mydas* within Blue Bay MPA.
2. Understand the population demographics of the turtles within the study area.
3. Determine the nature of the usage of the marine park by turtles.

Results & Discussions

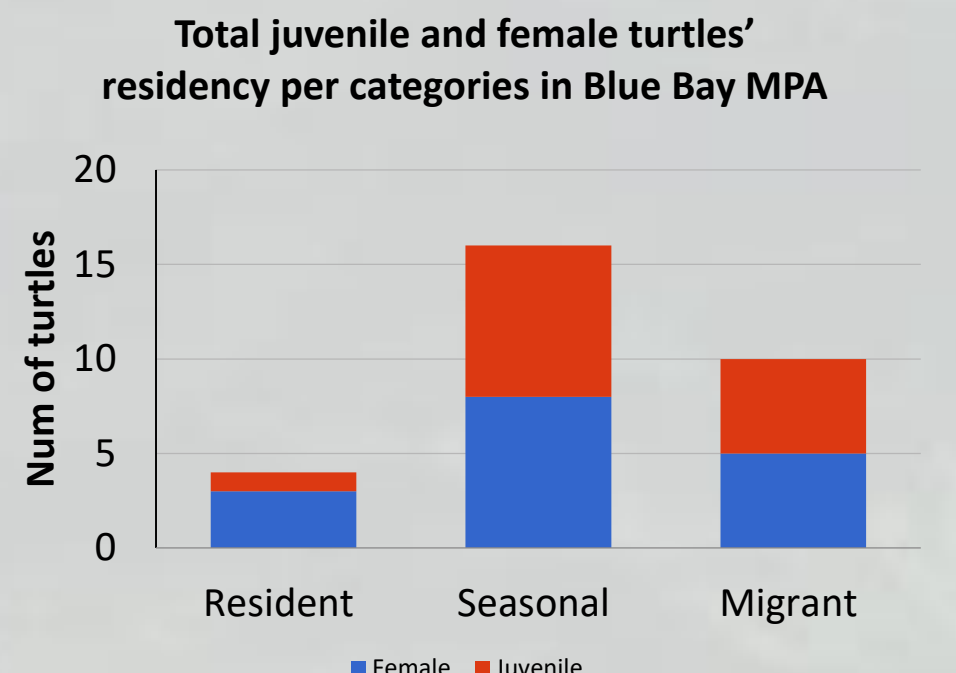


Fig 4 showing the number of turtles identified as female or juvenile and categorised into resident, seasonal and migrant

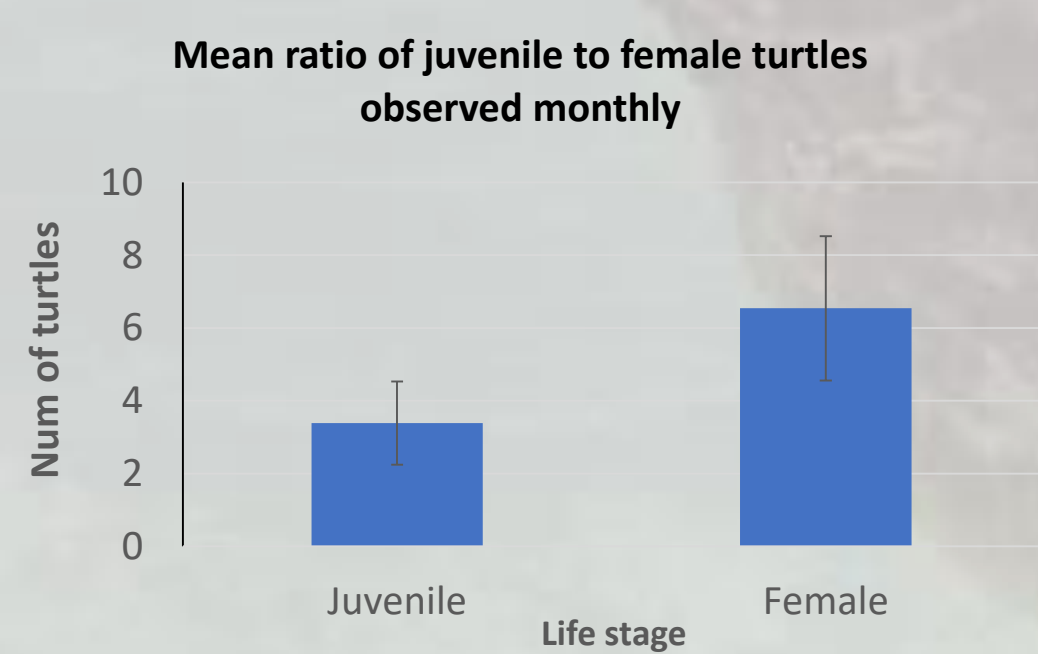


Fig 5 demonstrating the mean ratio of juveniles to female hawksbill turtle observed monthly over a year.

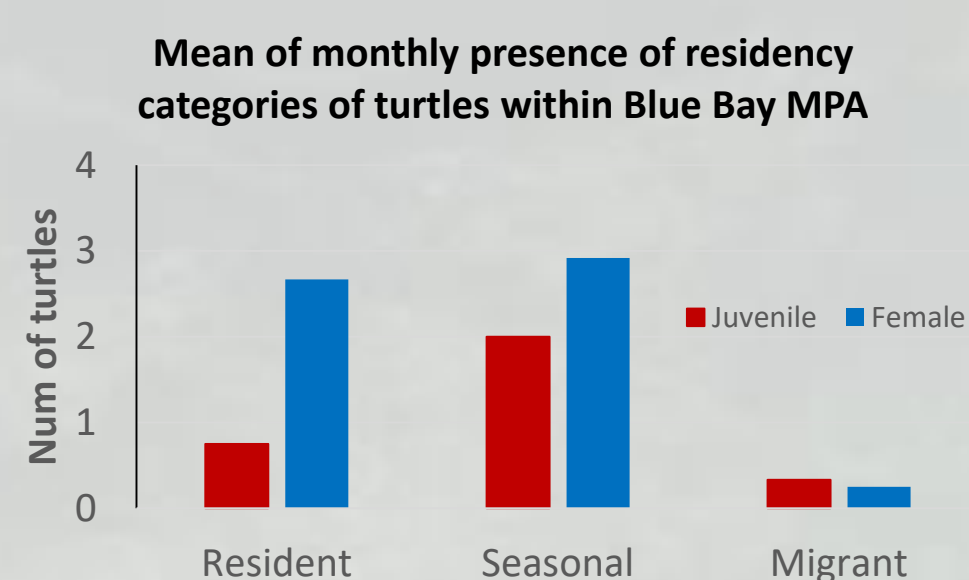


Fig 6. showing the monthly presence of turtles categories in MPA

- A total of 30 turtles were identified over a year of monitoring in Blue Bay MPA.
- No male turtle was recorded which could be attributed to different foraging patterns from females and juveniles or the possibility of remaining in close proximity to breeding sites.
- Dominance of adult seasonal females turtles amongst monthly overall observed population.
- Population of juveniles was relatively low compared to females.
- Observations of turtles' behaviour showed preference for branching coral rubble and *Pavona sp.* sub-massive corals dominant environments as foraging areas where they also exhibited resting behaviour to a lesser extent.
- Resting behaviour also extended to tabular corals dominant areas where they were often observed resting wedged underneath tabular corals. Swimming behaviour showed the usage of deep natural corridors.

Conclusion

- The Blue Bay MPA harbours a permanent residence of *E. imbricata* within its boundaries. The population is made up of residents, seasonal and transient juvenile and female turtles with a higher proportion of the latter.
- No males were recorded, so it is less likely for Blue Bay MPA to be a breeding site for hawksbill turtles. The site showed however strong foraging and resting patterns observed amongst turtles
- The information obtained from a year of monitoring could support photo-identification as a cheap and non-intrusive method for recovering basic population demographic data

Acknowledgement The authors would like to acknowledge the staff and volunteers of Eco-Sud for their help in the data collection

Methodology

The study was conducted from April 2018 to April 2019 with weekly monitoring. Photos of the left lateral view of the turtle's head, its tail and where possible its plastron were taken while snorkelling. In addition to photographic data, size estimation of the turtles was also recorded.

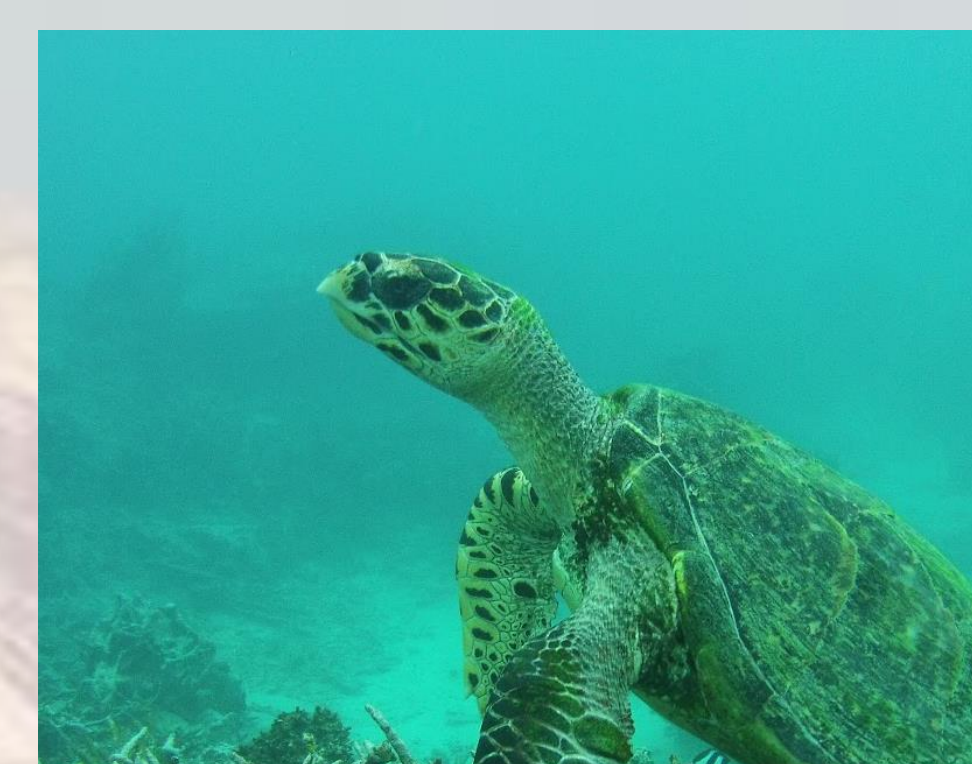


Figure 1 and 2 showing use of photographs to estimate size of turtles using a 1m measuring tape as reference and lateral pictures for identification of individuals.

The principal method for identifying the turtles was done by analysing the shape and configuration of the turtle's cheek scutes (see Fig 3). This was done by noting the position of the scute on the face and the number of sides that each scute had. The values of each scute could then be combined into a numerical code of to distinguish between individuals.

Gender of turtles was determined by inspecting presence of a significant protruding tail and bi-concave plastron which would both indicate males. Turtles under the size of the 70 cm was assumed as juvenile and all turtles presenting female's attribute (small tail, size > 70cm) were assumed as female

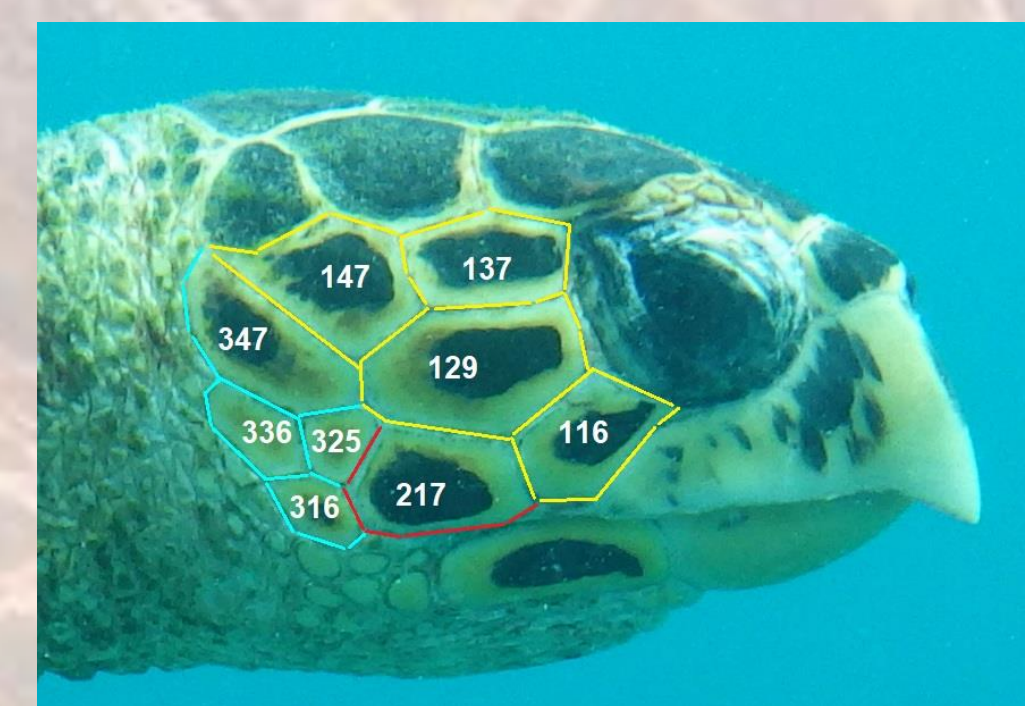


Fig 3. ID coding for BBMP01 read from bottom ocular scute with column positioning as first digit, scute position within column as second digit and number of sides of scute as third digit thereby denoting 116-129-137-147-217-316-325-336-347 as code for this particular turtle.

The significance of the usage of Blue Bay MPA to the turtles was assessed by determining the degree of residency of individual turtles and their activity carried by the turtles to qualify the nature of their usage within the bounds of the MPA. Turtles was categorised in three groups based on their residency, namely residents where an individual was absent less than three months over a year of monitoring, seasonal (resighted) sighted at least once and absent for more than a month of monitoring, and migrants who were observed only once.

