Area Abundance of Hawksbill Prey Items Within the Sandy Bay West End Marine Reserve, Roatán, Honduras

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Introduction

- Sponges compete with corals for space along coral reefs (Diaz and Rützler, 2001).
- Algae may also outcompete corals, shading them and preventing growth (Burkepile and Hay, 2009).
- Hawksbills are primarily spongivores throughout their range and thus aid the health of reefs by limiting sponge competition with corals (León and Bjorndal, 2002).
- Abundance of sponge species may determine hawksbill choice during foraging (Rincon-Diaz et al, 2011).
- Berube et al (2012) discovered octocorals, algae, and two species of sponge in stomach contents of hawksbills in Port Royal, Roatán (Figure 1).

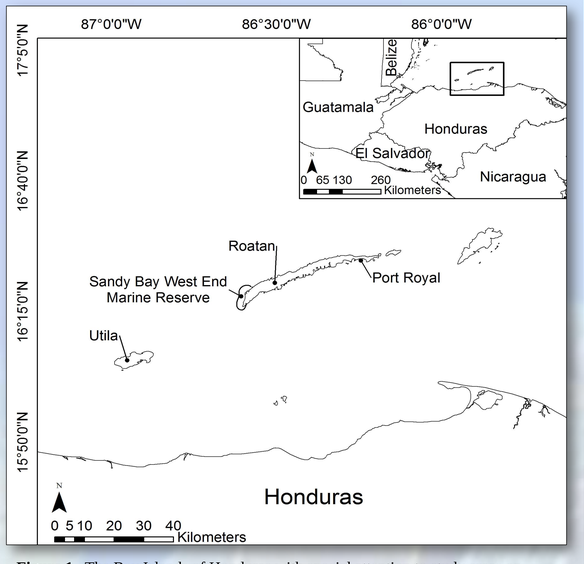

Figure 1. The Bay Islands of Honduras with special attention to study areas on Roatán (main map). Regional view (inset map).

- Baumbach et al. (2014) observed juvenile hawksbill foraging within the Sandy Bay West End Marine Reserve (Figure 1).
- However, the studies by Berube (2012) and Baumbach (2014) did not measure the amount of time hawksbills spent foraging on specific food items.
- This study aimed to identify food item preference by measuring the amount of time turtles spent foraging on specific food items along with their abundance throughout dive sites.

Methods & Materials

Figure 2. Photos being taken 2-3 m above a quadrat along the 30 m transect line. Two volunteers hold the quadrat stable to obtain photos from directly above the quadrat.

- Food item preference was established by timing how long hawksbills spent foraging on different sponge and algae
- To assess prey item abundance, reef transects were conducted for 15 individual dive sites.
- A 30 m transect line was divided into six, 5 m sections and placed over a random section of reef (Figure 2).
- A 1 m^2 quadrate was laid over the transect line at each of the six marks.
- Photos were taken approximately 2-3 meters above the quadrate.

- Photos of each quadrate were edited in Photoshop CS6 to bring out natural color of the habitat and improve photo clarity.
- Photos were uploaded to Coral Point Count with Excel extensions (CPCe) to calculate areas of the sponge *Geodia* and the algae *Halimeda*, *Lobophora*, and *Dictyota*.
- Food items in each quadrat were traced to calculate an area for each species (Figure 3).
- Areas were then summed to calculate a density for each species by transect.

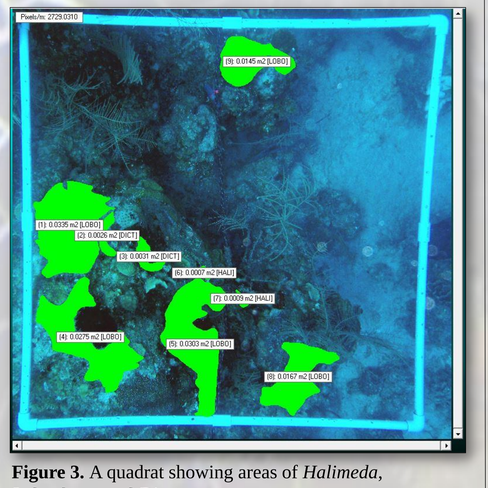

Figure 3. A quadrat showing areas of *Halimeda*, *Lobophora*, and *Dictyota*.

Results

- Habitat transects have been conducted at 15 different dive sites in the SBWEMR where 20 hawksbill foraging sightings have been recorded (Figure 4).
- The alga, *Dictyota*, was prevalent in most dive sites (Figure 5).
- Hawksbills spent more time foraging on sponge than algae (Figure 6).
- Red algae was identified as *Kallymenia* and was discovered in four of nine hawksbill stomach contents (Figure 7).

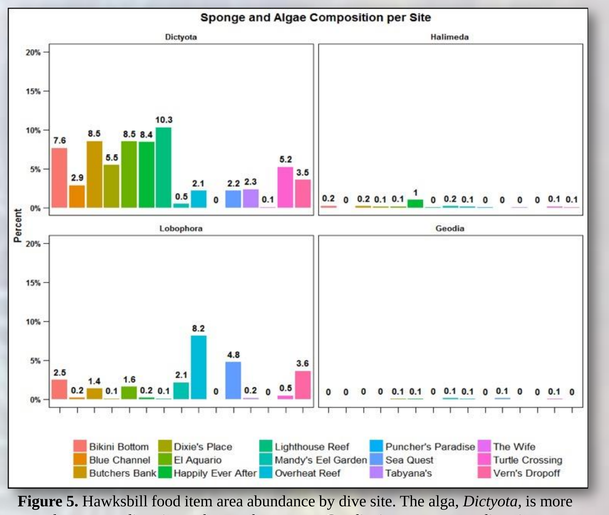

Figure 5. Hawksbill food item area abundance by dive site. The alga, *Dictyota*, is more prevalent across dive sites, whereas the sponge, *Geodia*, is scarce across dive sites.

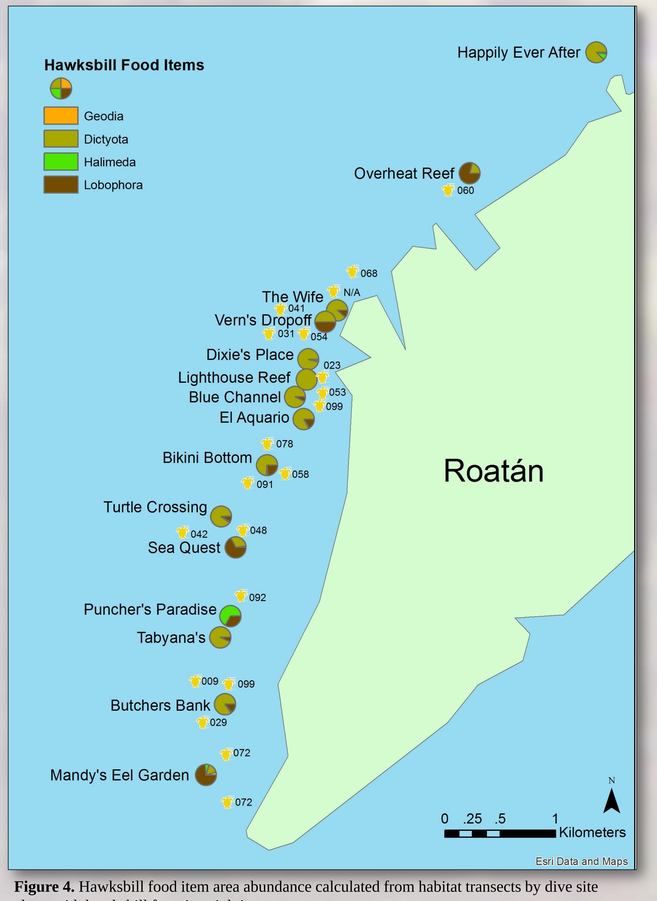

Figure 4. Hawksbill food item area abundance calculated from habitat transects by dive site along with hawksbill foraging sightings.

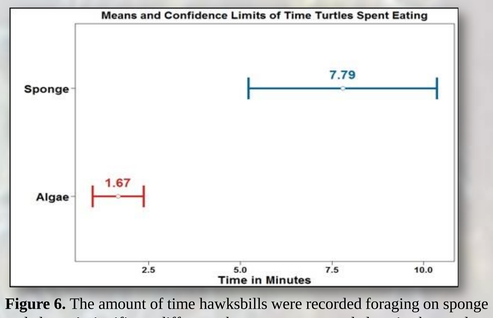

Figure 6. The amount of time hawksbills were recorded foraging on sponge and algae. A significant difference between sponge and algae is observed with more time spent foraging on the sponge, *Geodia*.

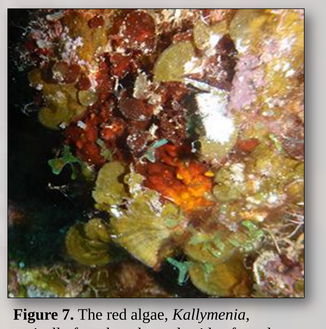

Figure 7. The red algae, *Kallymenia*, typically found on the underside of corals.

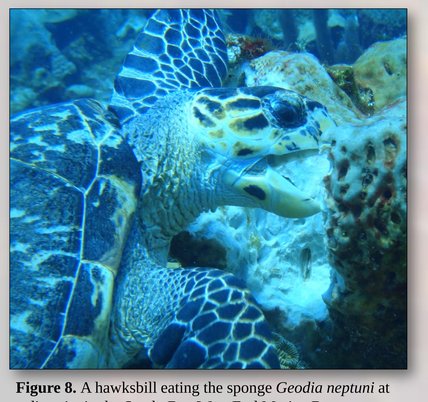

Figure 8. A hawksbill eating the sponge *Geodia neptuni* at a dive site in the Sandy Bay West End Marine Reserve, Roatán, Honduras

Discussion

- In the initial study, hawksbills were observed foraging on the sponges *Geodia neptuni* and *Geodia gibberosa*, and the algae *Halimeda*, *Dictyota*, *Lobophora*, and *Kallymenia* (Figure 8).
- Hawksbills have not previously been observed foraging on *Kallymenia*. This study notes the first occurrence of this behavior.
- Hart et al. (2013) states that a red algae was discovered in stomach contents of turtles, but did not identify algae to genus or species.
- We observed that hawksbills are not strict spongivores, but instead are omnivores.
- Future work in stable isotope analysis will help determine if hawksbills are foraging on any food items not yet observed.
- This information will be used to determine whether hawksbills are foraging outside the marine protected area (MPA), which will then help MPA managers assess the need for expanding protected area boundaries.

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