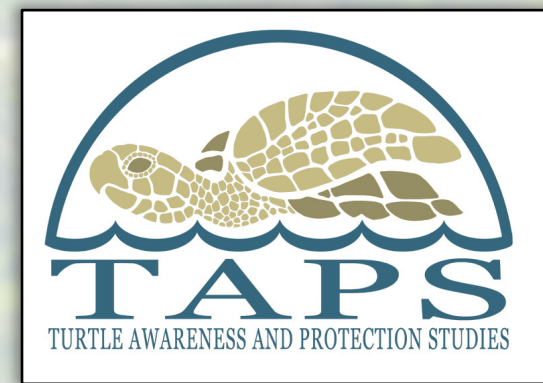




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# QUANTIFICATION AND IMPACTS OF NAUTICAL TRAFFIC ON HAWKSBILL PRESENCE IN A HONDURAN MARINE PROTECTED AREA: A PROGRESS REPORT

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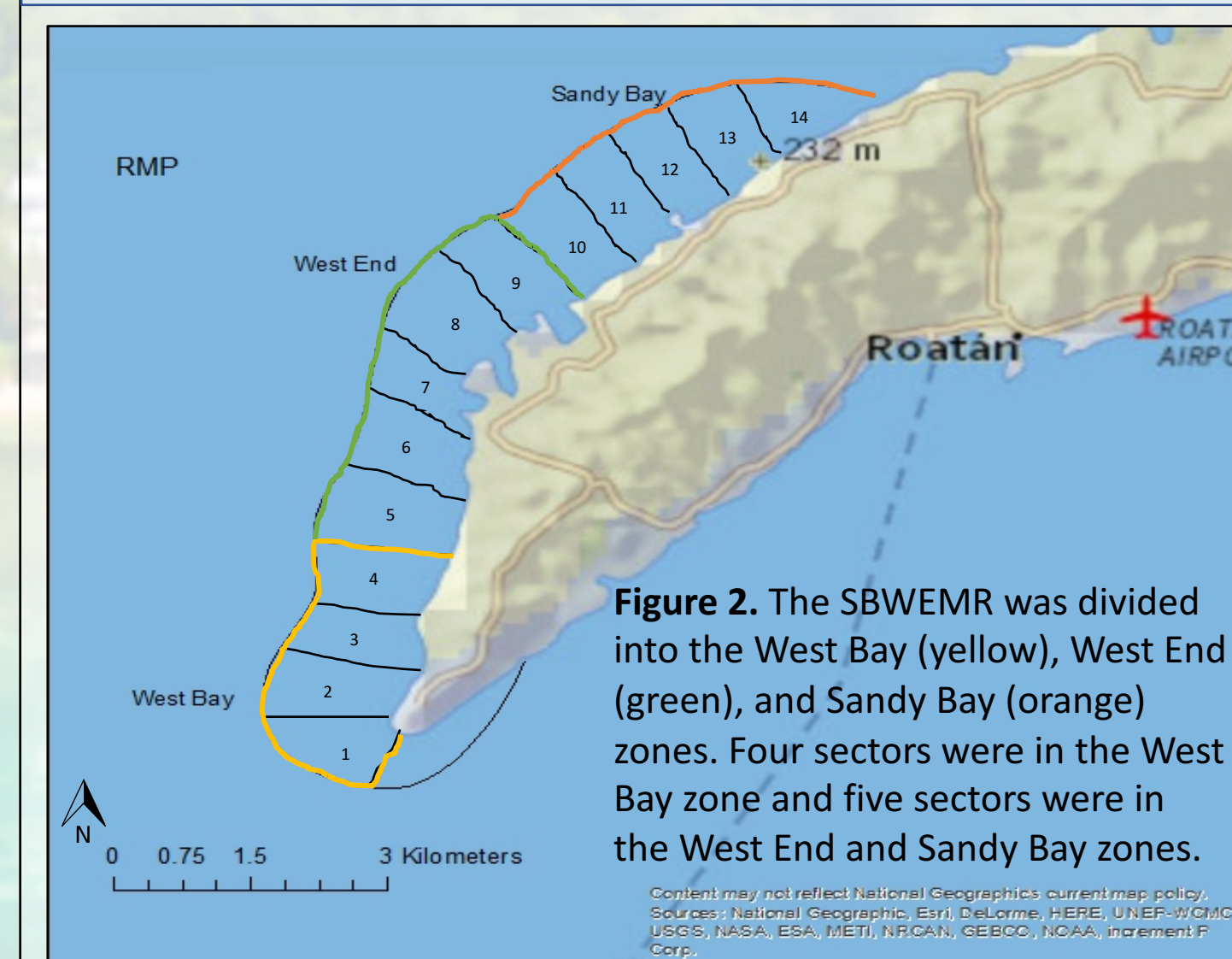
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## Background

- Marine protected areas (MPAs) implemented to reduce negative impacts of human activities on marine organisms (Lubchenko et al. 2003).
- Many MPAs overlook specific threats, such as nautical traffic and effect on distribution and behavior of marine turtles (Hilborn 2015).
- Sandy Bay West End Marine Reserve (SBWEMR) has many dive centers, hotels, and marinas, which generate boat traffic.
- Studies show boating activities can alter typical activity patterns, increase stress, and lead to physical injury in aquatic animals (Bracciali et al. 2012; Niemi et al. 2014; Pirotta et al. 2015).
- Previous studies suggest that SCUBA diver interactions may negatively impact hawksbill behaviors in the SBWEMR (Hayes et al. 2016).
- Neither effects of boat traffic on hawksbill distribution and presence, nor effect of boat traffic on hawksbill behavior have been assessed.

## Zones and Sectors Map



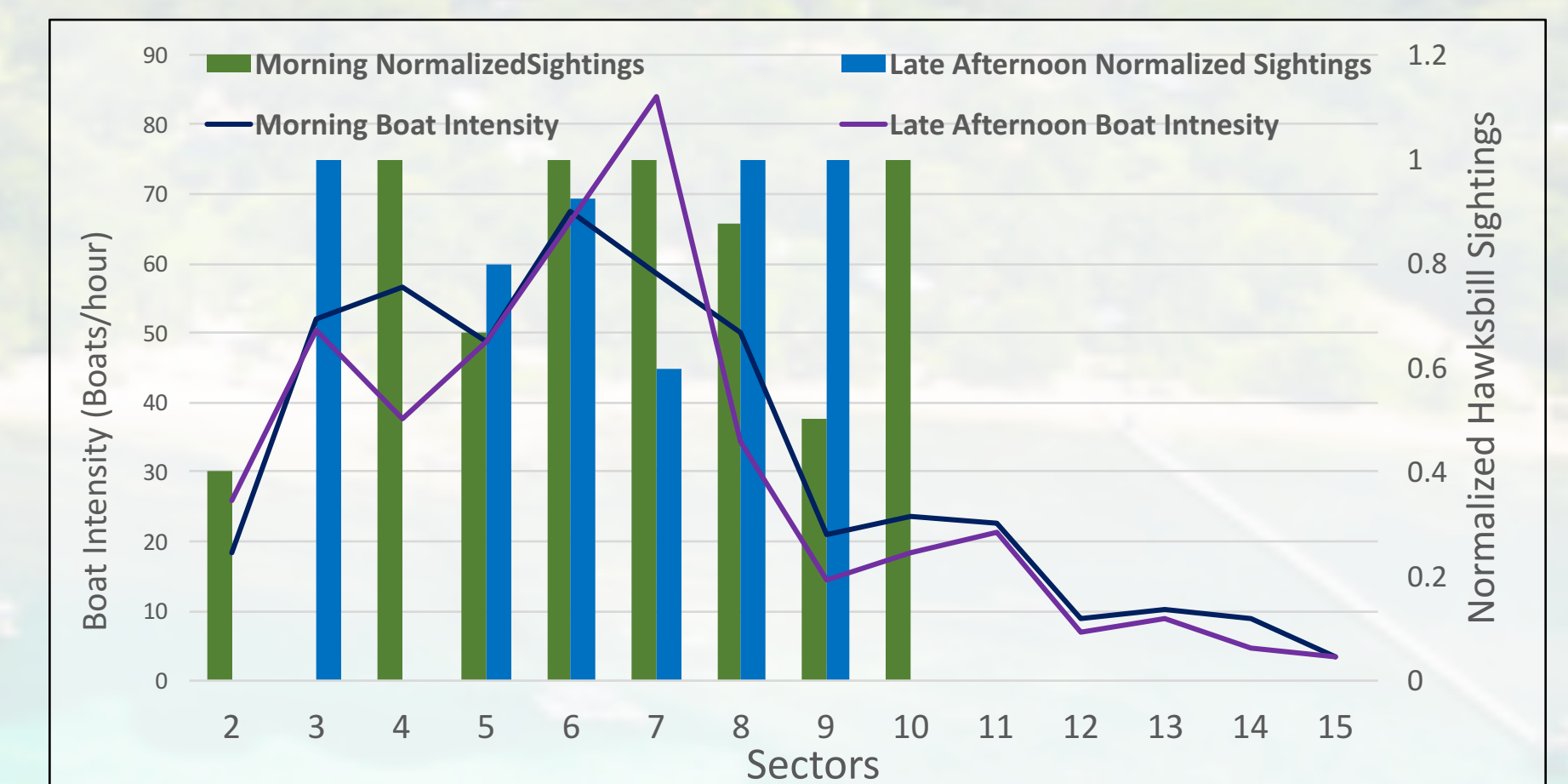
## Boat Classifications



Small: < 2 m; Medium: 2-8 m; Large: > 8 m

**Figure 3. Boat Size and Type.** Counted boats were classified as taxi, dive, recreational, or non-motorized boats, and as small, medium, or large.

## Results continued...



**Figure 10. Trend Comparison.** The boat intensity in the Sandy Bay West End Marine Reserve separated by sector and categorized by time period compared to normalized turtle sightings.

## Conclusion/Future Studies

- There is no significant difference in boat traffic intensity between the West Bay and West End zones, but there is a significant difference between the Sandy Bay zone compared with the West Bay and West End zones.
- There was a significant difference in boat traffic intensity at the sector level.
- Currently, there is no apparent trend in turtle presence throughout the observed sectors of the SBWEMR.
- Similar turtle presence in each sector was observed.
- Continue to collect video footage of hawksbills in the presence and absence of boats to determine behavioral change in the presence of boats.
- Complete turtle presence surveys in the midday time period, Sandy Bay zone, and certain sectors in West Bay and West End.

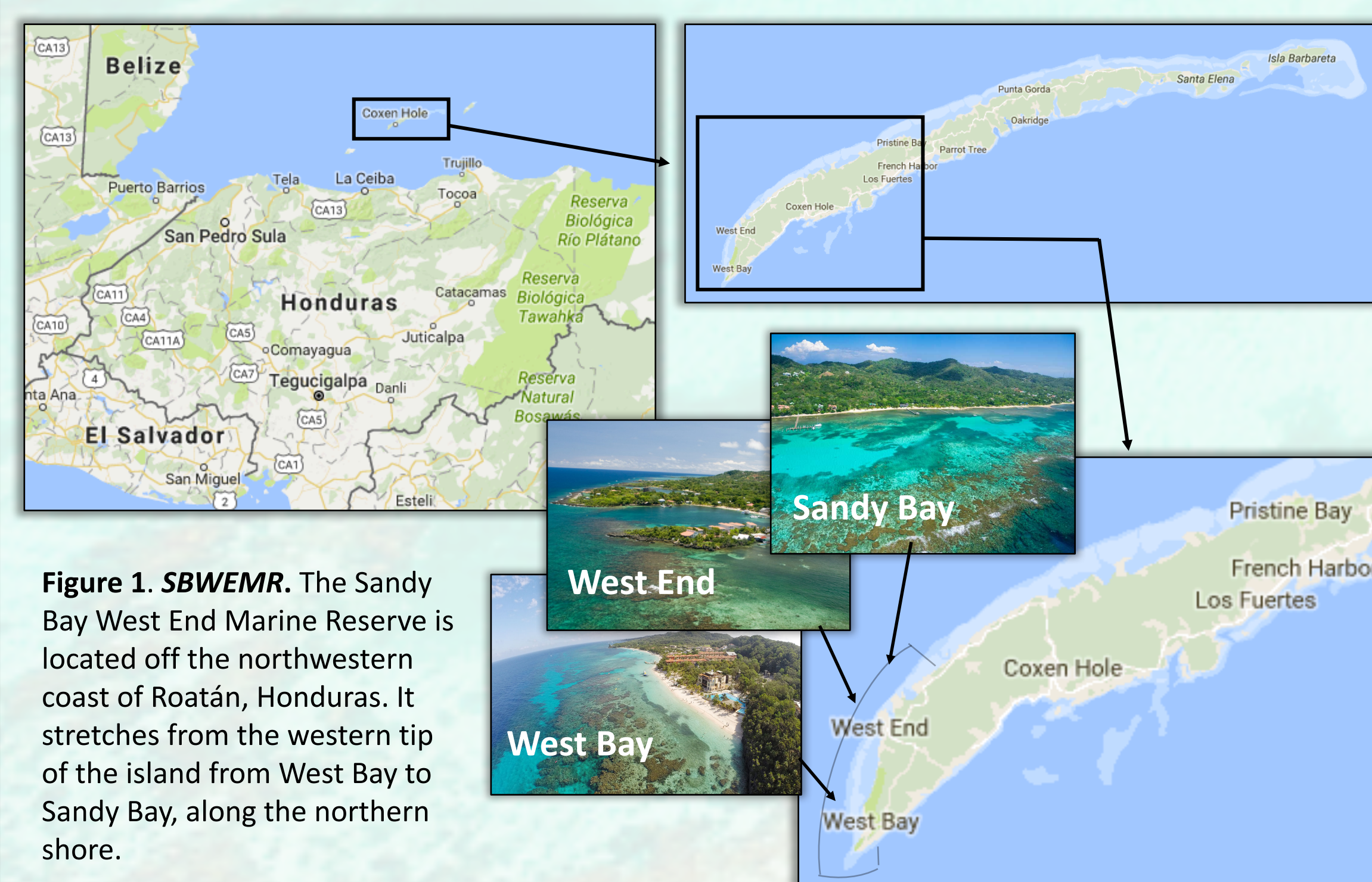
## Acknowledgements

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## Roatán, Bay Islands, Honduras

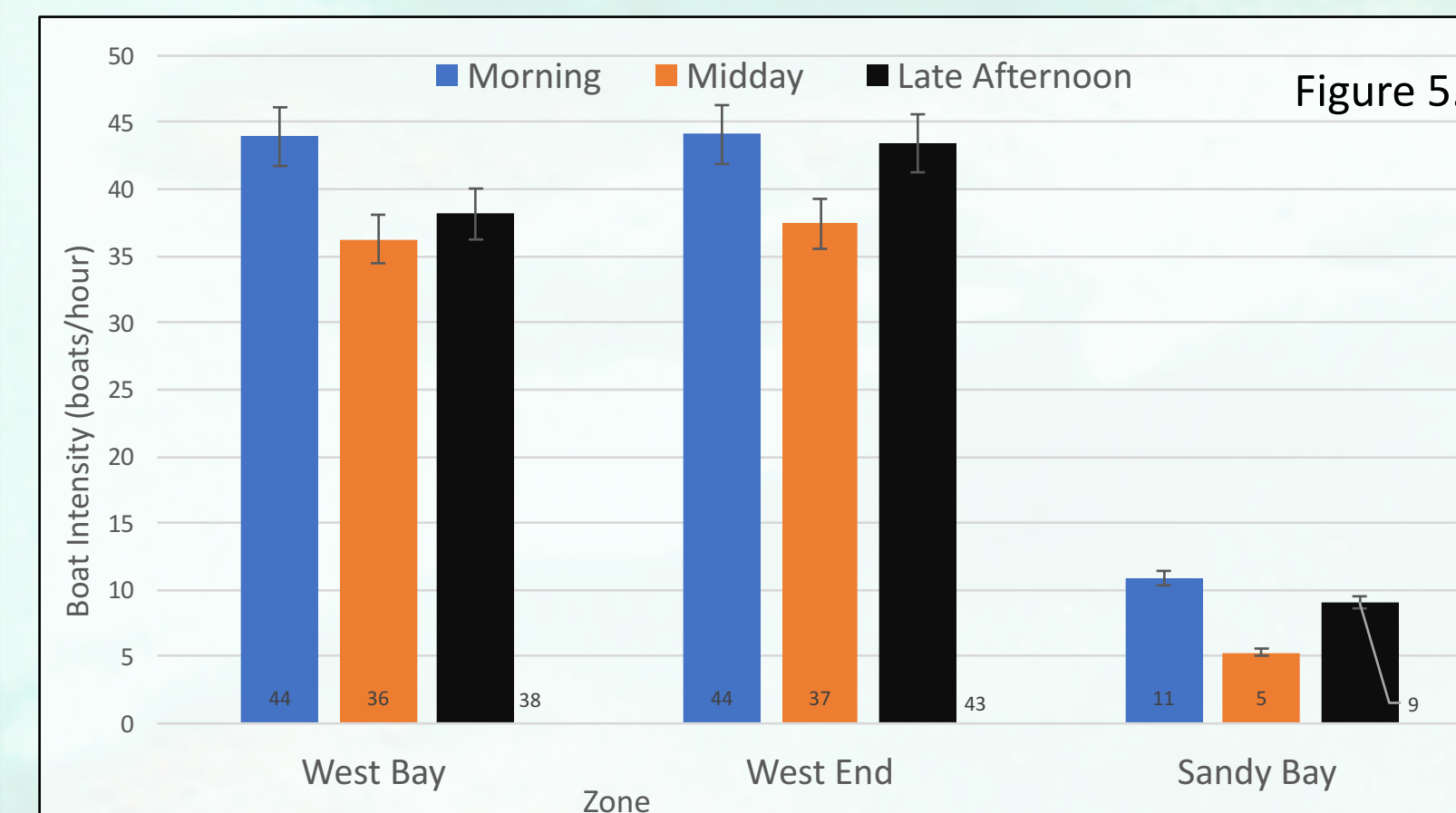


**Figure 1. SBWEMR.** The Sandy Bay West End Marine Reserve is located off the northwestern coast of Roatán, Honduras. It stretches from the western tip of the island from West Bay to Sandy Bay, along the northern shore.

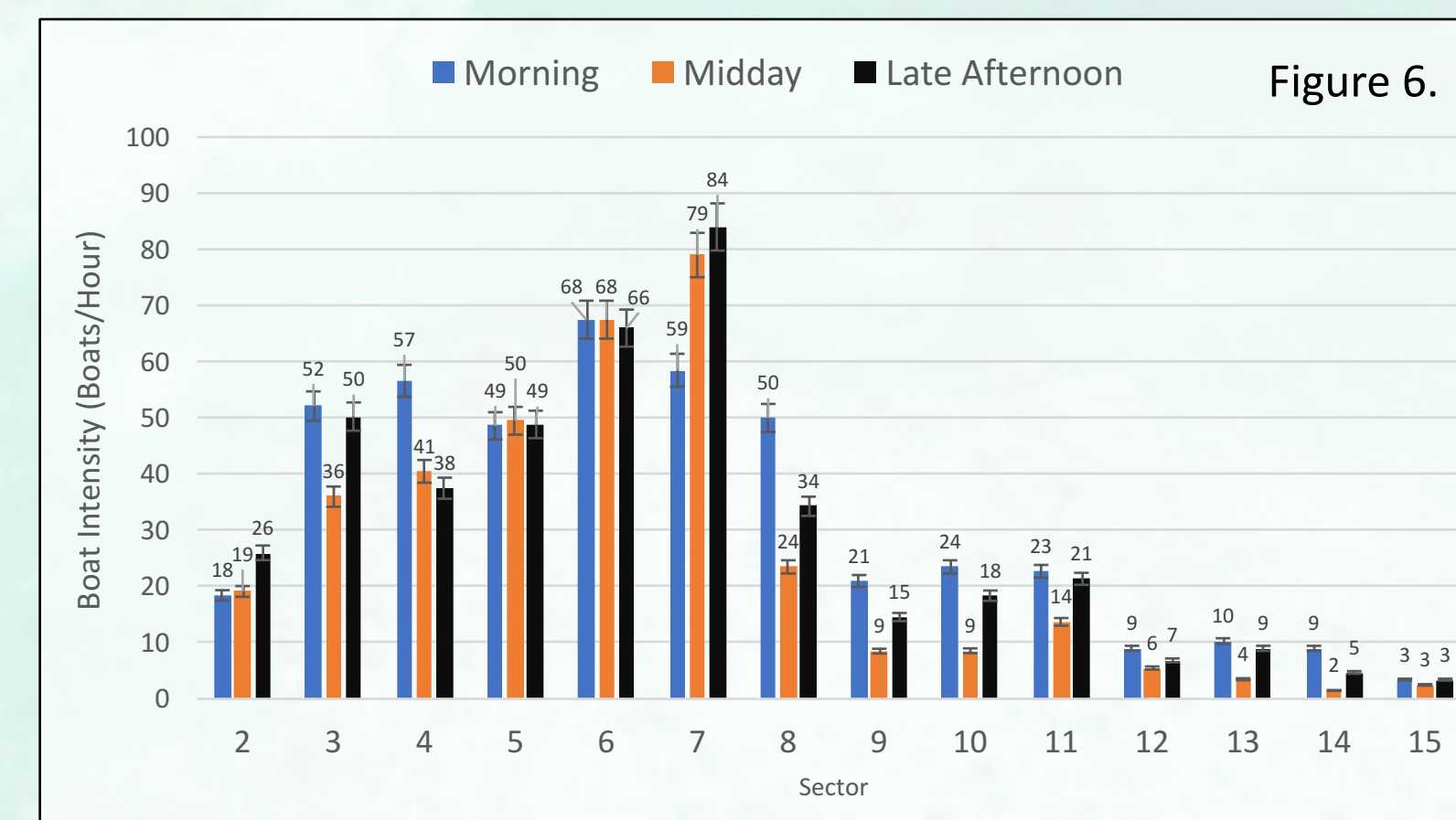
## Methods

- The SBWEMR divided into 3 zones: West Bay (WB), West End (WE), and Sandy Bay (SB) (Fig. 2).
- Zones further divided into 14 sectors for counting purposes (Fig. 2).
- WB, WE, and SB zones comprised of 4, 5, and 5 sectors (Fig. 2).
- Boat counts in the morning (8:30-10:30 am), midday (12:00-2:00 pm), and late afternoon (2:30- 4:30 pm).
- We calculated boat intensity (the number of boats passing through an area per hour) in each zone and sector during each time period.
- Boats were classified as taxi, dive, recreational, or non-motorized boats, and then specified according to size: small, medium, or large (Fig 3).
- Within each sector, turtle presence surveys were completed using SCUBA during the same time periods. For each juvenile hawksbill sighted, the location, turtle depth, time, tag number, and visibility were recorded.

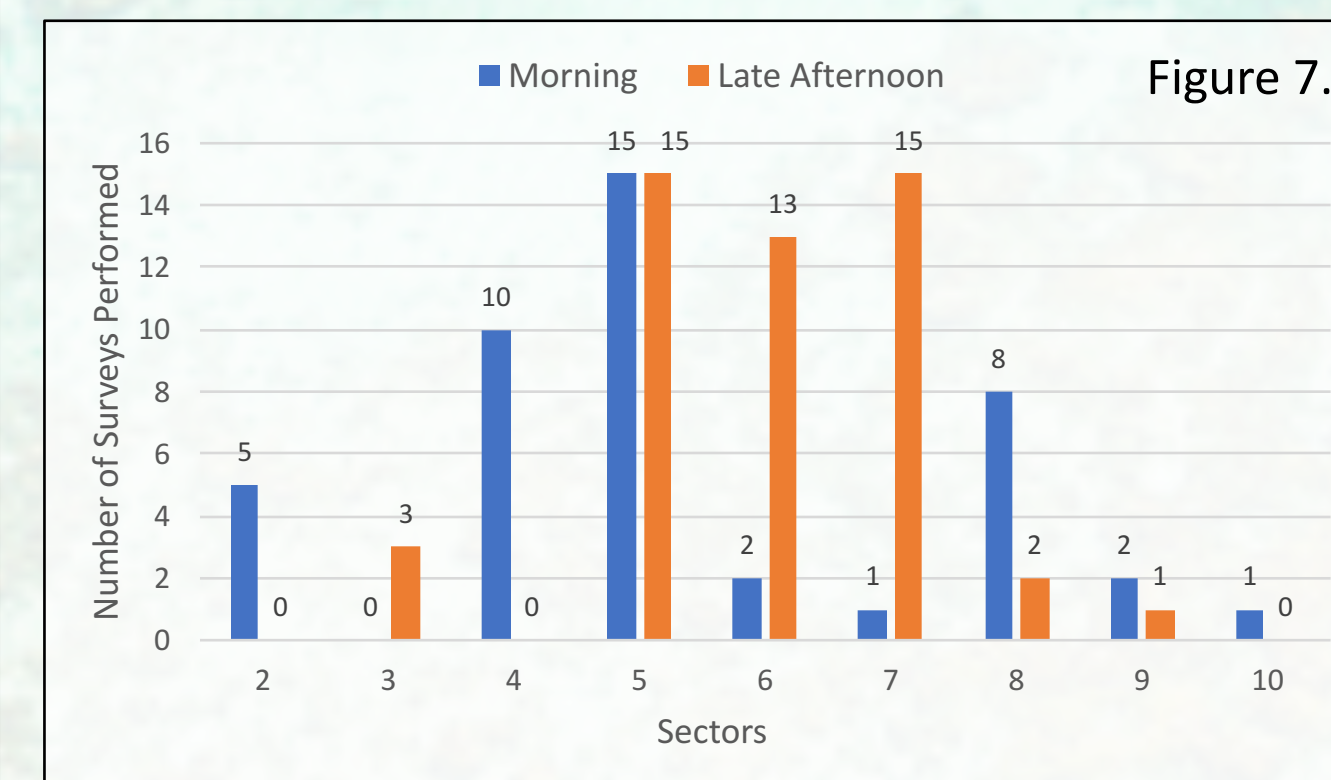
## Results



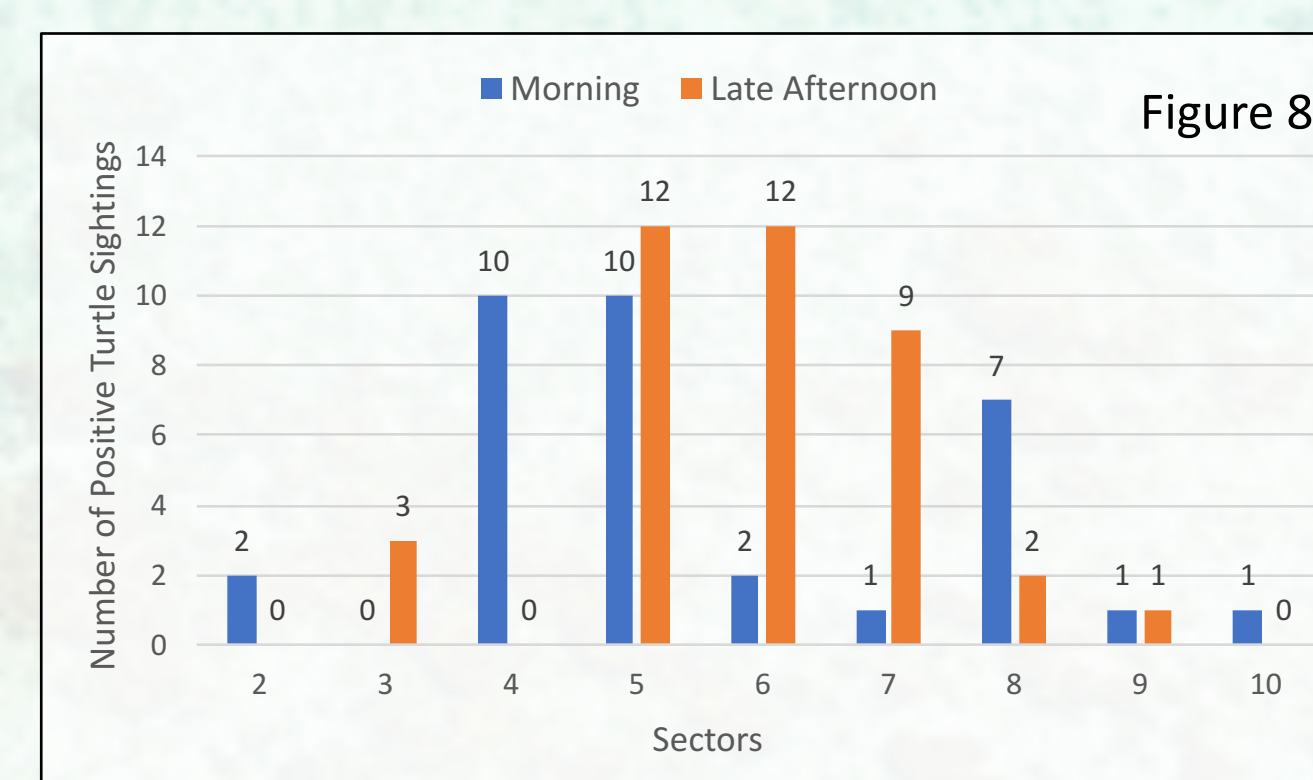
**Figure 5. Boat Intensity by Zone.** Boat intensity in the Sandy Bay West End Marine Reserve separated by zone and categorized by morning, midday, and late afternoon.



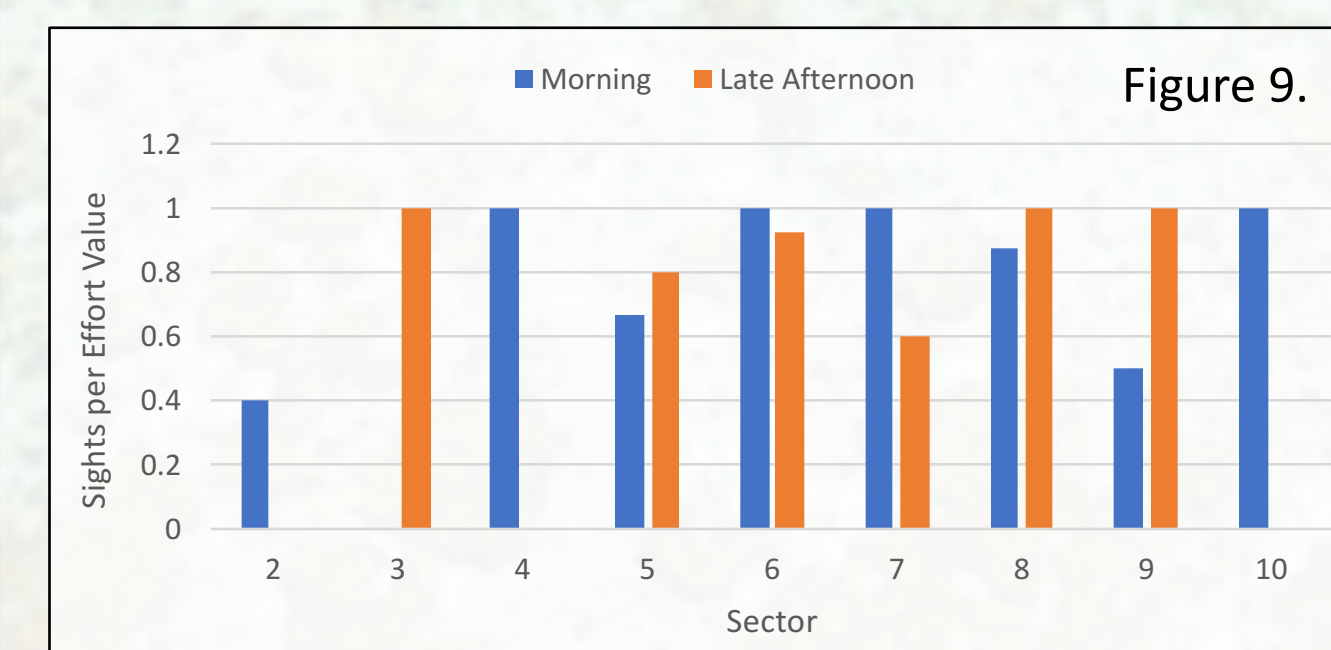
**Figure 6. Boat Intensity by Sector.** Boat intensity in the Sandy Bay West End Marine Reserve separated by sector and categorized by morning, midday, and late afternoon.



**Figure 7. Turtle Surveys Completed.** Number of juvenile hawksbill surveys completed in the Sandy Bay West End Marine Reserve in the morning and late afternoon.



**Figure 8. Turtle Sightings.** Number of juvenile hawksbill sightings in the Sandy Bay West End Marine Reserve separated by sector and categorized by morning and late afternoon.



**Figure 9. Normalized Turtle Sightings.** Due to unequal observations, comparative values were created by dividing turtle sighting events in each sector by the number of observations in that sector.

