The Elusive Hawksbill Turtles (Eretmochelys imbricata) of The Florida Keys National Marine Sanctuary



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INTRODUCTION

The Florida Hawksbill Project started in 2004. An aggregation of primarily sub-adult hawksbills (>50 cm SCL) was identified in the reefs of Palm Beach County [1,2,3]. Genetic analysis revealed multiple source rookeries, particularly Mexican haplotypes [1]. We hypothesized that the turtles in Palm Beach had originally been recruited as small juveniles in more shallow reef habitats somewhere in South Florida, perhaps in the Florida Keys National Marine Sanctuary (FKNMS). The shift to neritic habitats is a critical stage of development at which turtles are vulnerable to many new challenges. Our objective was to conduct a long-term mark-recapture project to describe the population dynamics and distribution of hawksbills in FKNMS.

Conservation Status: Critically Endangered [4]

Threats: Plastic & Fishing Debris, Climate Change, Boat Strikes, Light Pollution, & Poaching [5]

Major Nesting Locations: Caribbean Islands and Central America [6] **Diet:** Primarily Spongivores [7]

Movement Behaviors: High Site Fidelity [3]

Habitat: Rugose Coral Reef (Spur & Groove or Patch Reef), Hardbottom Data Gaps: Florida Key's Population Dynamics; Recruitment Site Criteria

METHODOLOGY

Survey and Capture

- 2015-2024 (May-Oct)
- 70 reef sites (<20 m depth) Key Largo-Key West
- Upper: Key Largo Islamorada (Carysfort Alligator)
- Middle: Long Key Big Pine (Long Key Reef- Looe Key) Body Morphometrics and Weight
- Lower: Sugarloaf Key West (American Shoal- Western Photo Identification Dry Rocks)
- 2-6 snorkelers swam or towed; visually located and Recaptured hawksbills with missing flipper tags hand captured

Tagging and Sampling

- Inconel Flipper Tags (ex. KKJ345) inserted on the Body Condition Idices = Body Weight (kg)/ leading edge of the front flippers
- PIT tags inserted internally in the shoulder area

- Skin, Scute, & Blood Samples
- received new replacements

upper

Keys

Data Analysis

- Straight Carpace Length³
- Catch Per Unit Effort (CPUE) = # turtles / search hrs
- Growth Rates: \triangle Growth (cm or kg)/ \triangle Time(days)
- Generalized Linear Regression: area of reef site (km²) & hawksbills observed (captured + seen).
- Second-order Polynomial Linear Regression: growth rates of hawksbills and mean SCL between captures

RESULTS

POPULATION

81 capture events - 66 new encounter captures Straight Carapace Length(n-t) mean = 39.66 cm ± 9.61 cm SD; range= 19.3 - 62.5 cm (N=80) (Fig. 1) Weight mean= $8.73 \text{ kg} \pm 6.23 \text{ kg}$; range= 1.1 - 31.8 kg (N=72)

BCI: 1.13 ± 0.10: 'robust' condition No Relationship Between Reef Site Area and Number of Hawksbills (p=0.24)

RECAPTURES

15 recapture events of 14 individual turtles

Growth Rates (SCLn-t) mean= $6.19 \text{ cm yr}^{-1} \text{ range} = 2.48 - 10.21 \text{ cm yr}^{-1}$ (Fig. 2)

longest time between captures: 1086 d (2.97 yr) Relocations (N=2)

Site Fidelity mean time between captures: 512 d **CATCH PER UNIT EFFORT** West Sambo > Middle Sambo (~3.7 km) for new, untagged hawksbills Eastern Dry Rocks > Sand Key (~3 km) 0.24 hr⁻¹ 0.07 hr⁻¹ 0.26 hr⁻¹

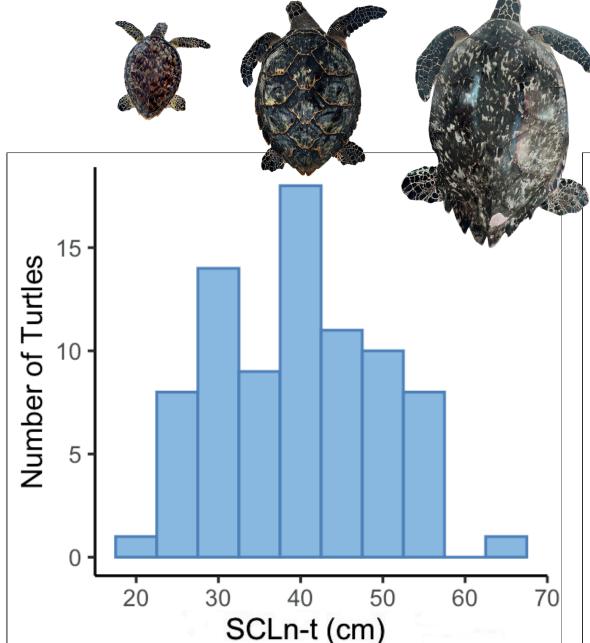


Figure 1. Size sistribution of hawksbills captured in the Florida Keys by straight carapace length (SCL) notch to tip (n-t).



Keys **Lower Kevs** Location FL Keys Growth Rate (cm/yr) SE FL 40 50 60 SCLn-t (cm)

Figure 2. Growth rates and straight carapace length (SCL) notch to tip (n-t) for hawksbills caught in Monroe County and Southeast Florida.

DISCUSSION

FKNMS serves as a critical nursery habitat for juvenile hawksbills. FKNMS appears to serve as a recruitment site for hawksbills arriving

in Florida from multiple rookeries around the region.

- Hawksbills are more abundant in the upper and lower Keys, reflecting habitat preference for continuous, highly rugose reef.
- Compared to other populations in the region, growth rates of hawksbill in these size classes fall within the reported ranges and appear to show a healthy population [8].
- Growth rates of smaller turtles found in FKNMS provide a clearer understanding of time to maturity estimate: 11-15 years.
- The similarities (or differences) in haplotype frequency between sites will help identify points of entry to the Florida system from various nesting rookeries [1].
- Our findings provide baseline data for future comparative studies the physiological condition and/or growth rate of the turtles is linked to the productivity of the habitat.
- The extent of the Florida aggregation is limited to how many juveniles are arriving via oceanic currents, how many are successfully transitioning, and the carrying capacity of the habitat itself.

REFERENCES: https://bit.ly/4oxJWUH

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