Running out of sand: Sea turtle nesting activity on Félicité Island, Seychelles

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Introduction

The Seychelles are home to one of five significant regional populations of hawksbill turtles with a distinct nesting period from October until March. Green turtles are also known to nest in the Seychelles, but nesting density in the granitic inner islands is significantly lower compared to the coralline outer islands. Félicité Island, located in the inner islands, is renowned for its hawksbill turtle population. The island harbours five sandy beaches: four on the northwestern and one on the southwestern side of the island, which is difficult to reach due to challenging terrain. Six Senses Zil Pasyon resort was established on the privately owned island in October 2016, occupying one third of the island, including the northwestern nesting beaches. In December 2021 the Olive Ridley Project partnered with Six Senses Zil Pasyon to establish a monitoring and conservation program to ensure long-term data collection and protection for nesting turtles on the island.

Methodology

Daily patrols were carried out between April 2022 and April 2023 to record any nesting attempts and true nests (Figure 2) on the four main beaches. GPS location, species, and track width were recorded for each nest and false crawl. If the turtle was encountered, photographs for the identification of the nesting female were taken, which was used to track clutches per female per season and an estimate of the length of internesting intervals.

Nest excavations were carried out 48-72 hours after hatching to record clutch size, depth of egg chamber, the estimated developmental stage of unhatched eggs and to release any trapped hatchlings.

Results

A total of 87 false crawls and 51 true nests were recorded on all five beaches on Félicité Island (Fig. 2, Tab. 1). Hawksbill nesting activity reached its peak from October to February (Fig. 4). The mean track size recorded for hawksbill turtles was 78 cm (N = 73, SD = 7 cm). Nesting activity by green turtles was comparatively low with a peak in nesting observed between July and September 2022, with a total of eight true nests and seven false crawls. Mean track width for green turtles was 122 cm (N = 14, SD = 13 cm).

Median egg chamber depth for green turtles was deeper than for hawksbill turtle nests and median incubation time from April 2022 to April 2023 was very similar for both species.

Tab. 1: Sea turtle nesting activity per beach on Félicité Island from April 2022 to April 2023. GR = green turtle, HK = hawksbill turtle.

Species	Median depth at the top in cm	Median depth at the bottom in cm	Median incubation time in days
Green	89 (SD== 20.3, N = 7)	105 (SD = 14.3, N = 7)	62 (SD = 19.0, N = 6)
Hawksbill	30.5 (SD = 11.5 N = 40)	45 (SD = 13.8, N = 40)	64 (SD = 12.9, N = 36)

Clutch size was recorded for 88% of nests and remained unclear in the remaining 12% due to full or partial predation by crabs (*Ocypode spp.*). Mean clutch size for hawksbill turtles was 160.6 (SD = 23.5, N = 38), which was significantly larger compared to 137.3 for green turtles (SD = 17.6, N = 6) (t-test, $p<0.005$).

Median hatching success was 80.1% for green turtles (SD = 35.5, N = 7) and 76.2% for hawksbill turtles on average (SD = 30.1, N = 36). Twelve of the hawksbill turtle nests had to be relocated due to immediate threat by beach erosion. When nests with 100% predation are excluded, average hatching success for relocated nests was 72% (SD = 19, N = 10) compared to 86.5 % (SD = 10, N = 13) for in situ nests on Grand Anse.

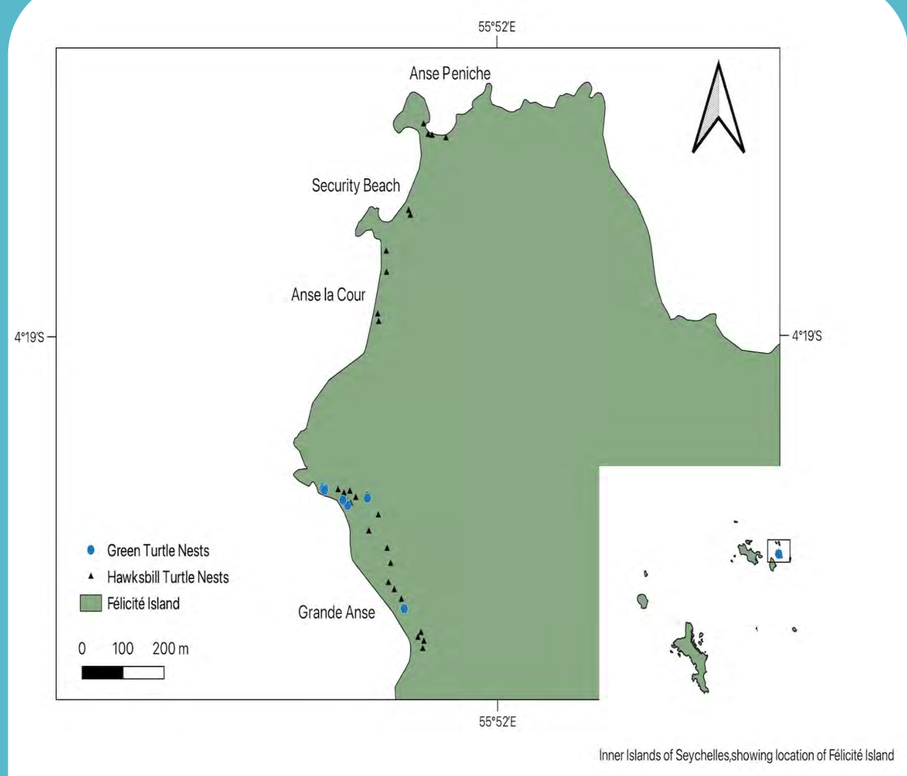

Fig. 2: Map showing the location and number of true nests on the four beaches on Félicité Island: Anse Peniche (N = 4), Security Beach (N = 2), Anse la Cour (N = 4), and Grande Anse (N = 30).

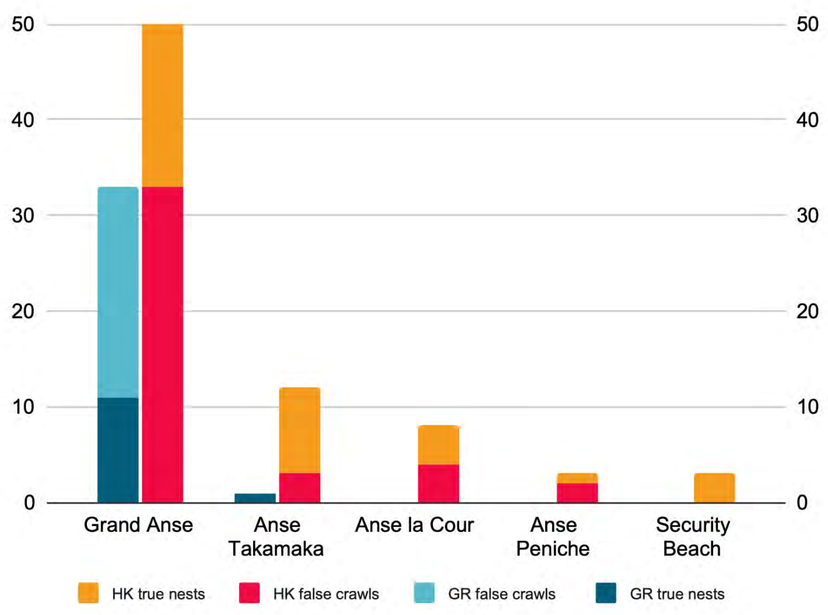

Fig. 3: Sea turtle nesting activity per beach on Félicité Island from April 2022 to April 2023. GR = green turtle, HK = hawksbill turtle.

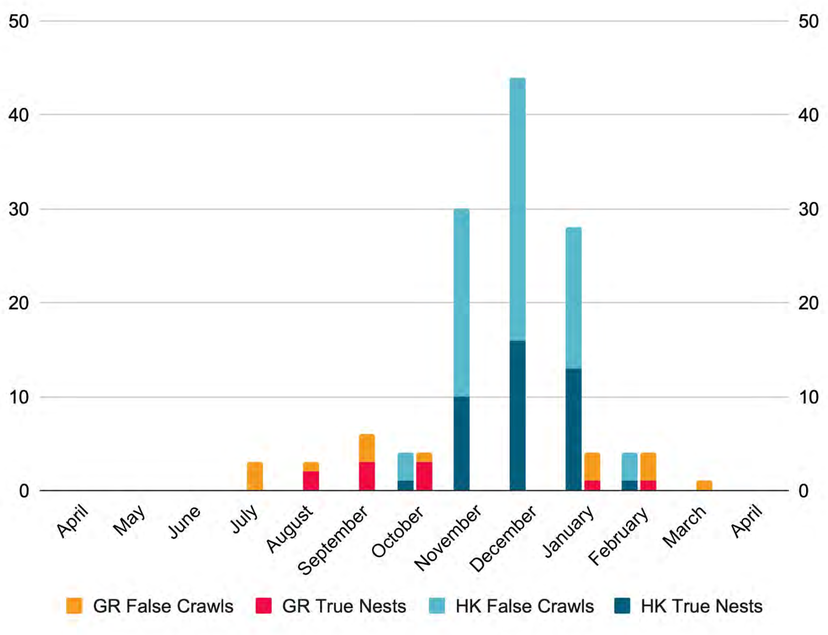

Fig. 4: Temporal distribution of sea turtle nesting activity on Félicité Island from April 2022 to April 2023. GR = green turtle, HK = hawksbill turtle.

Discussion

Greater numbers of nests have been documented on other islands within the inner islands of Seychelles, such as Cousin Island with up to 256 individual hawksbills emerging to nest per season (Allen et al. 2010).

The smaller number of nests on Félicité can be attributed the limited nesting space and potentially less protection efforts in the past. Additionally, one out of five beaches on Félicité could not be monitored regularly due to its remoteness.

The sandy beaches on Félicité all together span less than 750 m in length at their greatest extent and are extremely dynamic, undergoing drastic transformations with the changes in the monsoon season. The change results in complete erosion of nesting areas on the main beach of Grand Anse, which coincides with the beginning of the hawksbill turtle nesting season. The erosion makes the majority of the beach inaccessible for turtles and causes the loss or inundation of previously laid nests. Due to the severe erosion, the suitability of the island's beaches for nesting are questionable in the future in the face of increasing environmental challenges, e.g., sea level rise (Fish et al. 2008). Mitigation measures such as construction setback regulations, which are promising on other turtle nesting beaches (e.g., Fish et al. 2008), are unlikely to prove successful on Félicité, because the main habitat limiting factor is natural granite boulders. No previous data are available to comment on a trend in clutch numbers for either turtle species on Félicité, therefore we recommend continuation of monitoring reproductive females at Félicité to compare with population levels and trends observed at other islands in Seychelles.

Additional monitoring on the fifth nesting beach are recommended, as signs of illegal take were recorded in the area.

Fig. 5: Beach erosion at the westerly side of Grand Anse from November 2022 until February 2023. Photos were taken at the beginning of each month.

Fig. 1: Hawksbill turtle clutch exposed at erosion cliff on Grand Anse, Félicite Island.

Selected References and Acknowledgements

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ORP and Six Senses Zil Pasyon have been working together to protect sea turtles and their habitats since December 2021. Our permanent presence on Felicite enables ORP to maintain a photo ID database, monitor turtle nests and conduct educational awareness in the region. Thanks to our partnering resort, Six Senses Zil Pasyon, we were able to install Reolink cameras that help monitor turtle nests using motion sensors. ORP aims to better understand the size of Felicite's nesting and foraging turtle populations.

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