USE OF PHOTO-IDENTIFICATION FOR DETERMINING THE BASKING POPULATION SIZE OF HONU (*CHELONIA MYDAS*) AT HO'OKIPA BEACH

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Basking behavior is globally rare and only known to regularly occur in four places globally, and solely by the green turtle, *Chelonia mydas*. Because of this rarity, very little is understood about basking behavior. The Maui County Beach Park of Ho'okipa Beach, Maui, Hawai'i, USA represents a locally important basking site for Hawaiian green turtles (known as 'honu'). Due to the regularity with which high numbers of honu (<150) can be observed basking at Ho'okipa throughout the day/night, the beach has become popular with visitors and residents, with upwards of 700 people on the beach each day. This has caused clashes between community members and visitors for use of the beach that is a popular spot for surfing, snorkeling, and fishing. As such, community monitoring and education outreach regarding honu have been conducted for the past 17 years in an effort to create a safe place for all viewers and the honu. Community members and visitors alike often ask questions about honu habits, particularly whether the same individuals are observed basking each day at Ho'okipa. We chose photo-identification of individuals as the best, non-intrusive method to determine individual basking habits and frequency of re-sightings. Over the course of three months (July-September 2016), photographs of each turtle as it emerged onto the beach to bask were taken every four days between 0700 and 1900 using a Canon EF 75-300 mm f/4-5.6 telephoto lens. Only photos of the right side of the head were used in this analysis, since they could be reliably obtained due to the geography of Ho'okipa and our goal to not disturb the honu. Images were imported into Image Based Ecological Information System (IBEIS) software for analysis. We cropped images within IBEIS to create 'chips' of only the turtle's head aligned with the ground. We used IBEIS's ranked match system to determine the 5 most likely matches for each image, visually confirming each match. Using this approach, we identified 156 different individuals basking at Ho'okipa. We also used the frequency of sighting individuals to construct a mark-recapture analysis, with the individual days as our sampling interval. Using MARK, we estimated Ho'okipa to have between 159 and 171 basking honu during this timeframe based on a closed captures analysis with equal probability of capture and recapture. This is a sizable population of basking turtles, especially since the majority of basking at Ho'okipa occurs within an area less than 100 m2. Future studies will apply these modern techniques to the project's historical photographs, continuing cataloging basking honu across seasons and years. These data provide a baseline for investigating other aspects of honu basking, such as site fidelity, movements to other basking beaches over different temporal scales, and correlation of basking frequency with environmental variables. Our results offer valuable information regarding this understudied behavior of honu while also providing conservation managers with data for future actions. Finally, this project helps bridge the gap between community members and visitors by demonstrating proper honu observation and photography, while effectively communicating insightful scientific findings.

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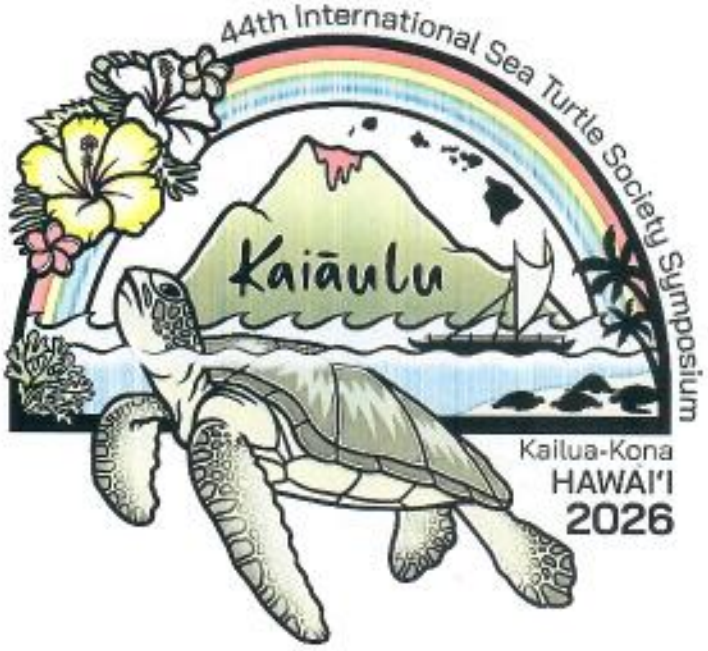

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