

Abstract

Assessing presence and habitat use of sea turtles within foraging grounds provides valuable information for managing both populations and regions. Availability of food sources and several environmental factors can influence sea turtle abundance and distribution in given regions. Distribution of green turtles (*Chelonia mydas*) in the Hawaiian Archipelago is determined by the presence of suitable foraging, breeding, and resting habitats. Hawaiian green turtles comprise a distinct subpopulation, which settle in foraging grounds around the Main Hawaiian Islands in between reproductive migrations to their main rookeries, situated on the Northwest Hawaiian Islands. Population structure of green turtles foraging aggregations found on the Main Hawaiian Islands is comprised of juvenile turtles measuring from 35cm in straight-line carapace length (SCL) to adult turtles larger than 81cm SCL. Pearl Harbor is a landlocked estuary with restricted public access situated on Oahu, one of the Main Hawaiian Islands. In this study we aimed to assess temporal and spatial patterns in habitat use of green turtles in Pearl Harbor. From March 2000 to May 2011, linear dive transects to survey for sea turtles were performed in Pearl Harbor; the Harbor and the Entrance Channel were divided into 21 specific areas. Divers recorded the number of turtles sighted per transect, qualitative sighting data on sea turtle species such as behaviour and size, and environmental predictors during the transects. Marine environment of the sampled locations was characterized to the maximum extent, using both direct observations from the time-period considered and current data. We applied a Hierarchical Generalized Additive Model with a Zero-Inflated Poisson distribution to model turtle sightings as a function of temporal and environmental predictors. We found a general increase in turtle records along the time-period examined and a non-uniform distribution of green turtles in Pearl Harbor. The increase and spatial distribution found reflect conservation efforts to the Hawaiian subpopulation and quality of habitats found in Pearl Harbor Entrance Channel. Entrance Channel locations provided resting habitat, having relatively higher macroalgae and coral cover, underwater caves, and seagrass present. The lower number of turtles detected within the harbor is probably a combination of two factors: a true absence of turtles in this region and a failure in turtle detection caused by poor visibility conditions. We found seasonality to the presence of green turtles, with a slight decrease in turtle sightings during the early months of the year. Size distribution encountered followed the patterns observed on other Hawaiian Main Islands, with a prevalence of individuals ranging from 50cm to 1.0m SCL sighted in transects. We found turtles from the three size-categories to have distinct preferences regarding depths they occupy. Smaller turtles were sighted in transects at shallower sites and larger individuals on deeper locations. Our study allowed to reconstruct green turtle past use of an historic location such as Pearl Harbor, over ten years of sampling, and identified significant resting habitat within the landscape. We hope these results will ultimately provide useful information for managing turtle populations which use Pearl Harbor and contribute to the extensive knowledge on the ecology of Hawaiian green turtles.

Keywords: Green turtle; Direct in-water observations; Distribution modelling; Behaviour; Resting; Pearl Harbor