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Assessing the Impact of Animal-Borne Cameras on Juvenile Green Sea Turtles (*Chelonia mydas*)

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INTRODUCTION

This research study was created with the desire to understand the potential impacts of animal-borne cameras on wildlife. Animal-borne cameras are cameras attached to live animals providing unique insight into the ethology of these animals. We focus on juvenile green sea turtles (*Chelonia mydas*) , currently considered endangered (IUCN Red List 2019). Through reading multiple scientific journals, it was clear that the historically challenging ethological research of sea turtles provoked the use of these animal-borne cameras (B. Calmanovici et. al 2018), transforming this method into a globally used research tool. Previous research on the effects of animal-borne devices such as metal tags show an effect of drag to the sea turtle caused by the deployment of animal-borne devices, hindering their swimming abilities (Thomson et al. 2015), leading researchers to infer similar negative effects of drag from animal-borne cameras. Ultimately, these recording devices have been suspected to alter natural behaviors of this species (Jones et. al 2013). Through conducting our study, we aim to understand the perceived impacts of these cameras on the green sea turtle, as well as to better interpret the accuracy of studies that use animal-borne cameras to investigate the behavioral dynamics of sea turtles in the wild.

Figure 1.

Figures 1 &2, Footage captured using CEI TurtleCams, August 2018.

Figure 2.

METHODS

Figure 3, CEI owned Phantom DJI Mavik® drone used to film individuals, November 2019.

Drones, or Unmanned Aerial Vehicles (UAV), are non-invasive-devices that capture aerial footage (Rees et. al 2014. During our study, we used UAVs to observe the natural behaviors of sea turtles as well as the movement speed of sea turtles before and after TurtleCams were deployed. By using these drones, we hoped to be able to recognize the hypothesized changes in behavior.

Figure 4, Juvenile green sea turtle swimming with a CEI TurtleCam mounted on it's carapace, October 2019.

TurtleCams are animal-borne cameras that track behaviors of turtles in their natural habitat (Jones et. al 2013). We used them in our study to observe the underwater behaviors of juvenile green sea turtles. Each camera deployment collects between 3-4 hours of POV (point of view) footage. From the analysis of this footage, we categorized 9 main behaviors of 9 different sea turtles. Further analysis and data collection can provide useful information to better protect these endangered species and habitats.

RESULTS

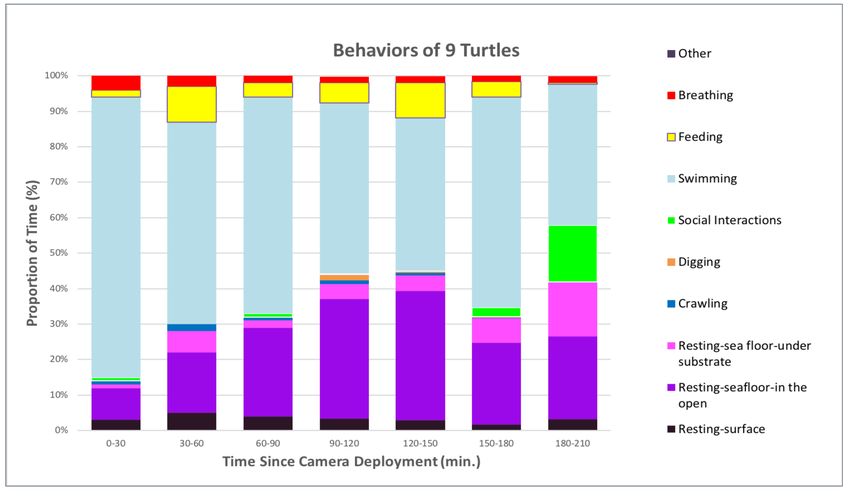

Figure 5. This graph shows the average proportion of time spent on different behaviors across nine turtles within four hours after turtle cam deployment. The behaviors outlined are the most common observations noted in turtle cam footage.

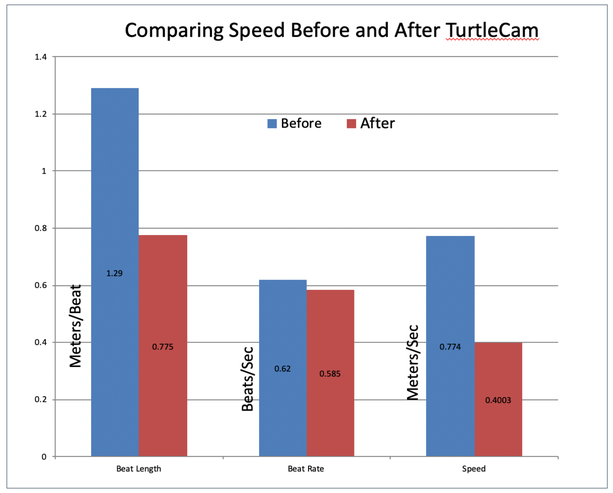

Figure 6. Impact on speed graph shows speed and flipper beat rate of turtles before and after turtle cam deployment. Blue column depicts pre-deployment data while red column shows post-deployment information. Beat length (meters), beat rate (number of beats per meter), and distance (m per second)

DISCUSSION

Our study of juvenile green sea turtles aims to understand the impact of animal-borne cameras along with human interaction on a sea turtle. While trying to discover the effect of drag derived from the TurtleCams, we analyzed the average flipper beat rate and the average speed using drone footage. In our drone analyses, we found that a turtle without a turtle cam mounted moved faster and further per beat on average than turtles with a turtle-cam. In the behavioral analysis data, we observed average rates of certain behaviors to be altered after the initial deployment. Although our analysis of turtle-cam and drone footage shows altered behaviors and slowed movement speeds, our current data cannot conclude our hypothesis that animal-borne cameras impact the behaviors of juvenile green sea turtles, which can be accredited to the lack of time allotted to collect and analyze data in our study. All of our turtle cam and drone footage is manually analyzed which is incredibly time consuming.

Data will continue to be collected and analyzed in the future to hopefully conclude this study. Ideally, our study will urge future engineers to develop animal-borne cameras in a more streamlined design to lessen the potential effect of drag.

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