Loggerhead Sea Turtle Behavioral Response to Visual and Auditory Stimuli from Vessels

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Introduction

- Interactions between marine species and vessels can result in changes in energy expenditure, shifts in foraging activity, displacement, injuries, and even mortality.
- Marine turtles often use shallow coastal waters, characterized by high concentrations of boat traffic.
- To date, studies have focused on the potential population level effects of vessel related mortality on marine turtles. However, limited studies have focused on how vessels affect fine-scale behaviors of marine turtles.
- Examined the behaviors of *Caretta caretta* (loggerhead sea turtle) in Crystal River, Florida (Fig. 1).
- As a Threatened species, loggerheads are protected under the Federal Endangered Species Act and the Florida Marine Turtle Protection Act.
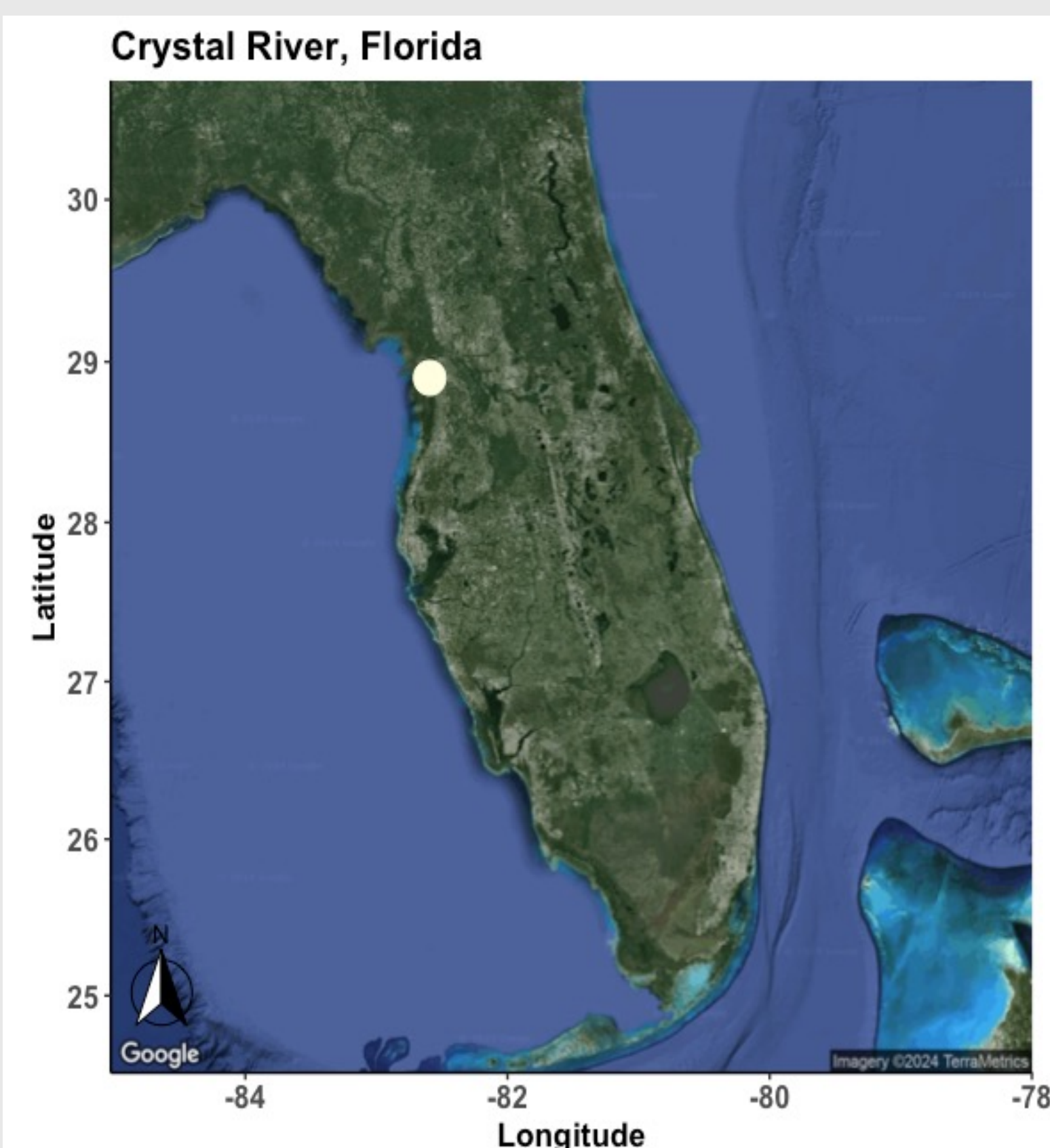- There were interactions with vessels among 8 out of the 30 individuals with cameras.

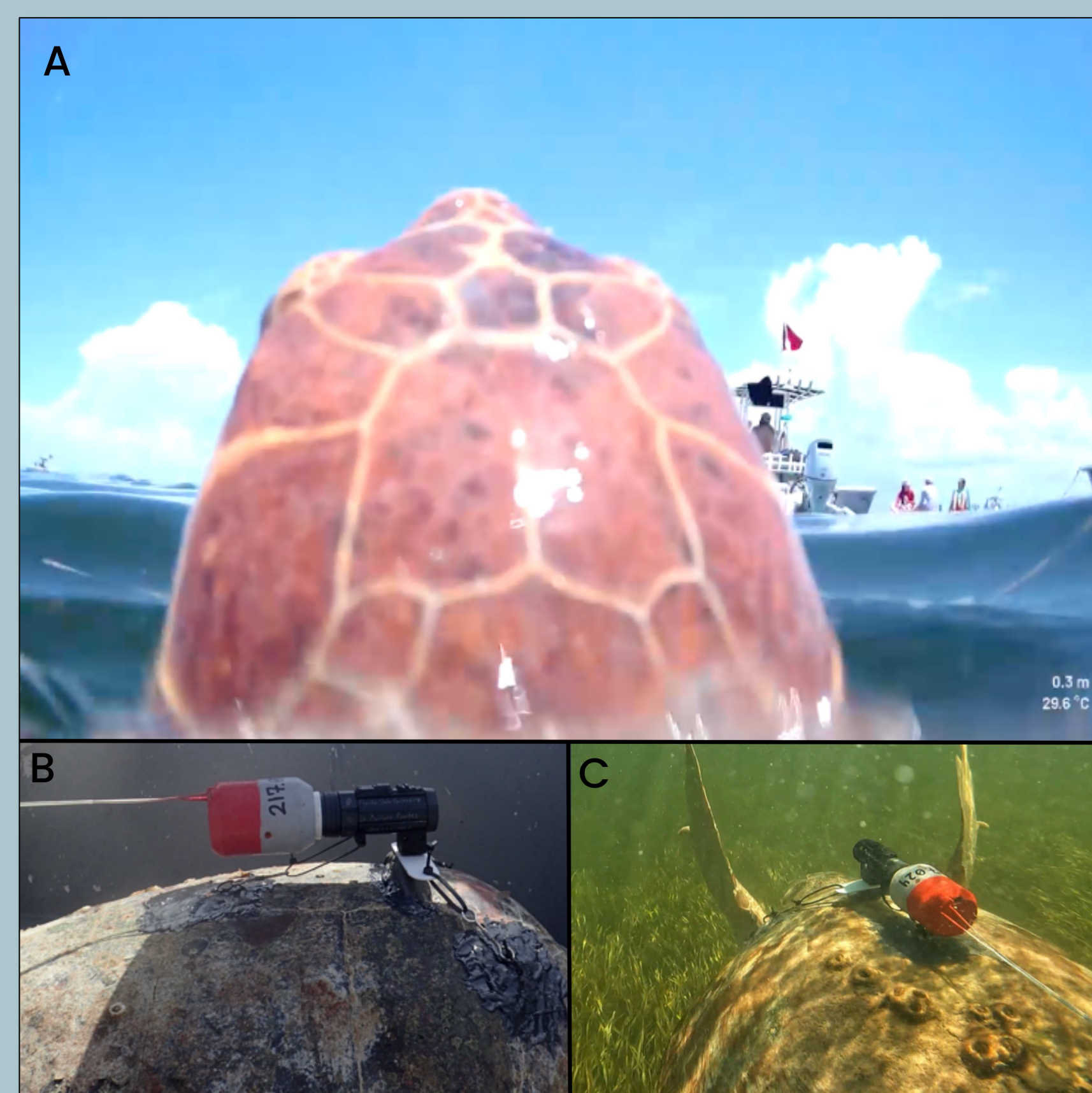Figure 1: Location of study site: Crystal River, Florida.

Figure 2: A) Loggerhead interaction with vessel during breath; B) camera on carapace during work up; C) loggerhead with camera during release (Photos: MTRECG).

Methodology

- A ParaLenz Vaquita camera was attached to the carapace (Fig. 2B).
- The Paralenz camera records the behavior and movement of the turtle for around 3.5 hours before detaching itself from the turtle for recapture (Fig. 2C).
- Data was collected off-shore in Crystal River.
- The videos were streamed in Microsoft OneDrive and data was recorded using Microsoft Excel.
- Swimming is recorded as "relaxed," or "alert," and breathing is recorded as "full," "partial," or "reconsidered."
- The recorded analysis is then used to investigate the breathing patterns before and after each vessel interaction (Fig. 2A) by assessing the five minutes before and five minutes after data (Fig. 4).
- Data was visualized in RStudio.

Results

- We deployed cameras on 30 loggerheads from from July 2021 to September 2023.
- Each deployment lasted approximately 3 hours.
- We observed loggerhead breathing, swimming, foraging, resting, and interacting (with vessels, pollution, or other turtles).
- The most common behavior was relaxed swimming.
- 8 of the 30 individuals saw or heard vessels (Fig. 2A).
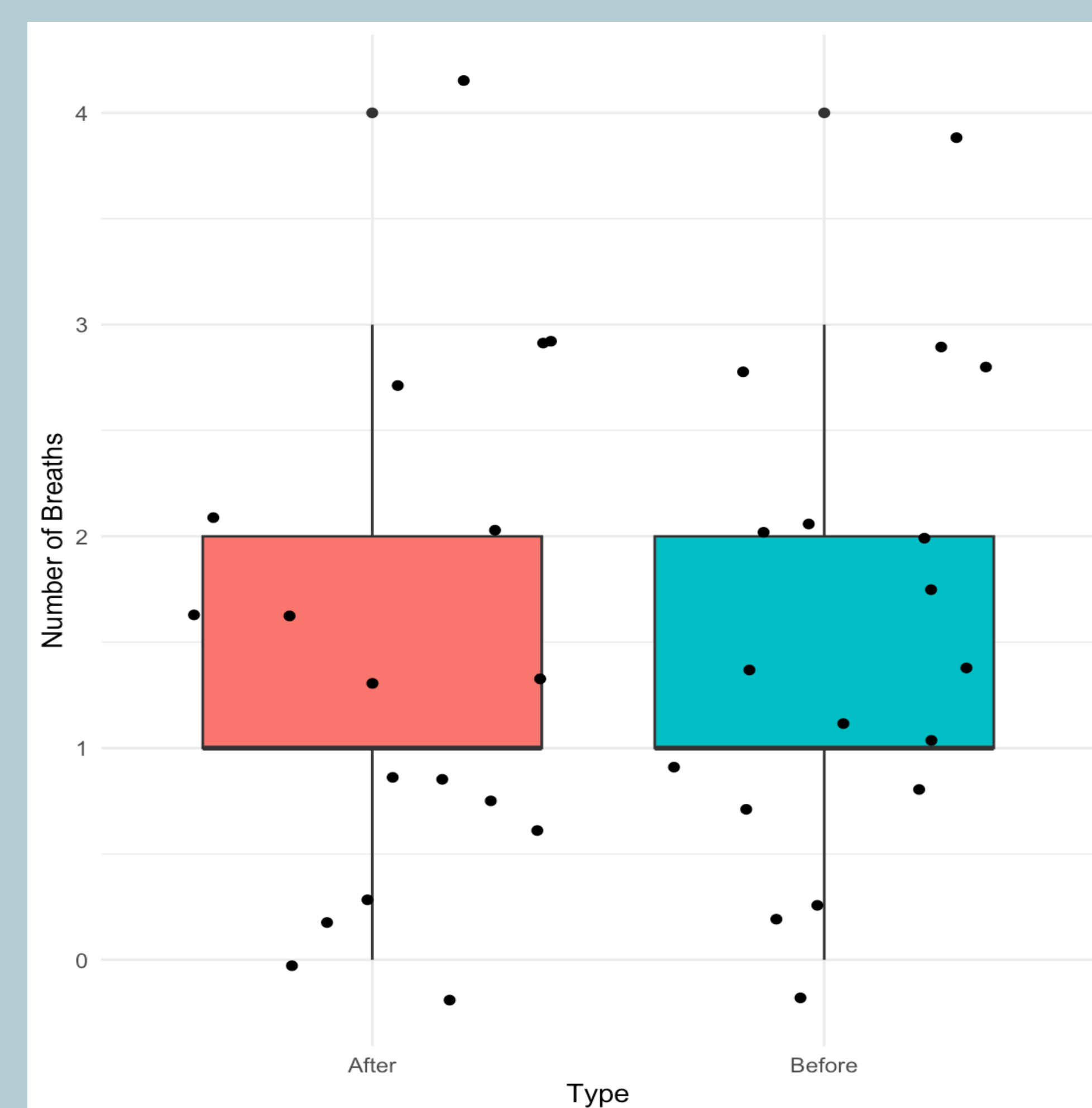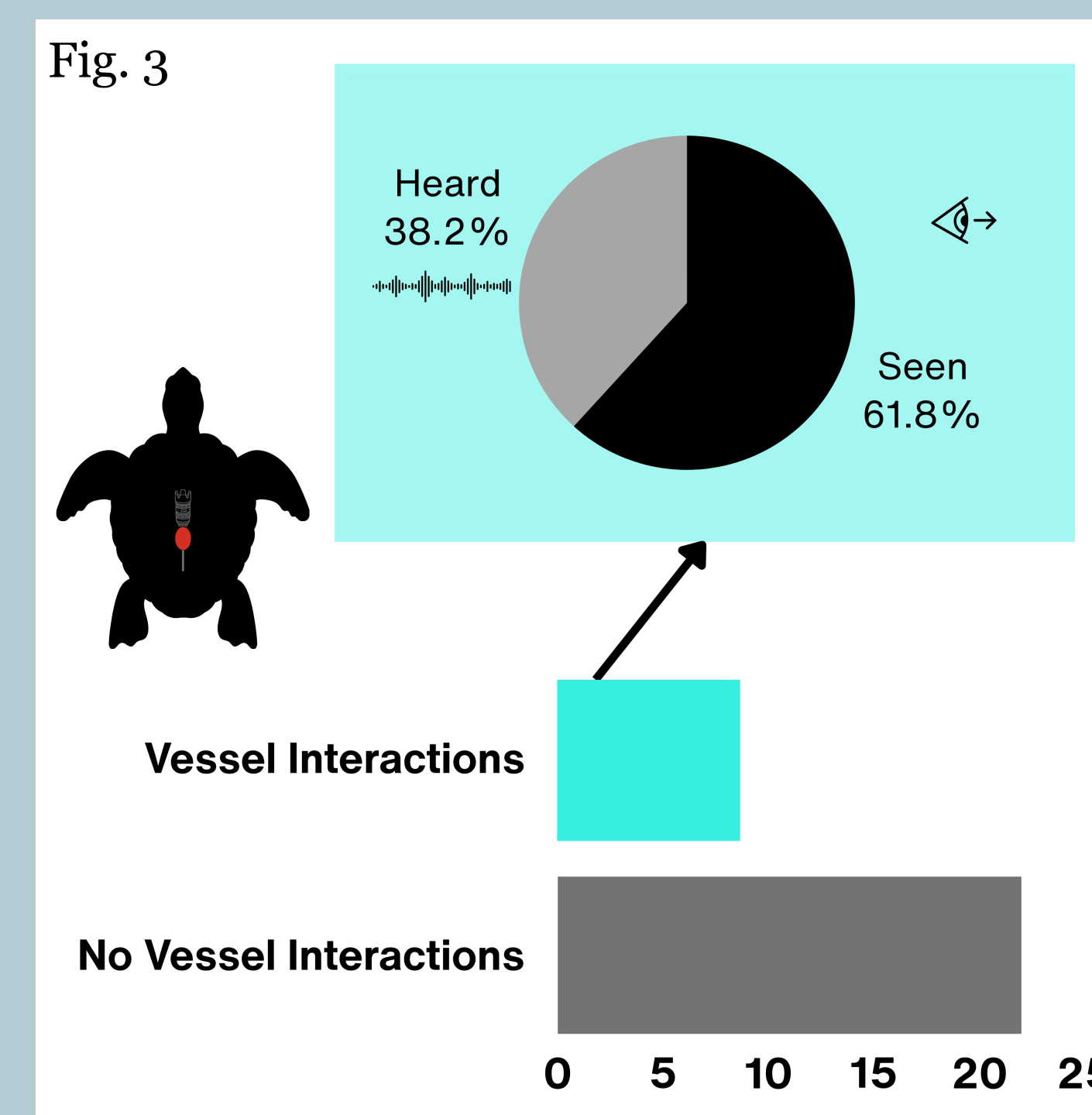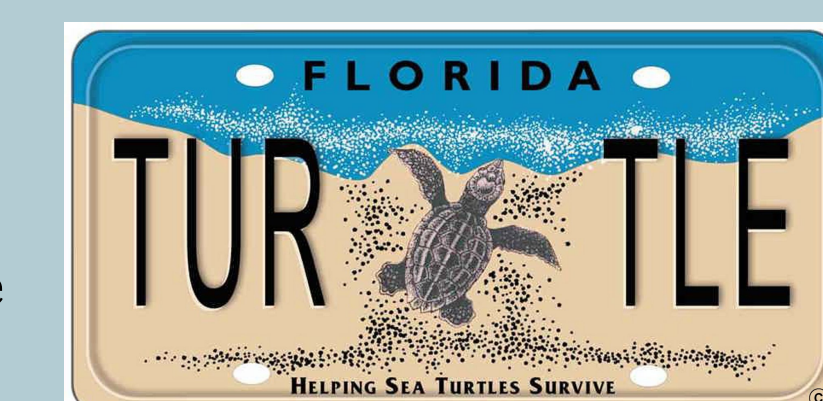

Fig. 3

Fig. 4. A boxplot showing the number of breaths before and after the vessel interaction.

Conclusions & Future Work

- A two-tailed paired t-test revealed no statistically significant differences in behavior (number of breaths or proportion of time in different behaviors) before and after interactions with vessels.
- Vessel stimuli appeared to not impact the behavior of turtles in this study, but more analysis is necessary.
- Additional work should consider longer deployments, with varying levels of vessel traffic to determine any potential temporal variations in behavior.
- Future work should employ similar methods of identifying behaviors with more complex bio-loggers to understand fine scale behavior.

Permitting

Permits were acquired from the NMFS ESA Section 10(a)(1)(A), FWC Marine Turtle Permit, and the Florida State University Animal Care and Use Committee permit.

References

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