Great White Shark, *Carcharodon carcharias*, Presence & Residence in The Upper Bay OF Fundy

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Introduction

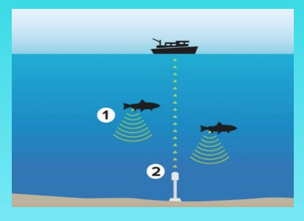
- White sharks are currently classified as endangered under the Species at Risk Act (SARA). This species is known to inhabit the Minas Basin through movement in and out of the Minas Passage (2).
- The Minas Basin possesses significant potential as a renewable energy site due to its powerful tides (1).
- Powerful tides can be utilized for generating power using tidal stream turbines, resulting in potential risks associated with turbine and shark interactions (1).

Goal: Advance understanding of white shark habitat utilization by addressing two questions:

1. What time of the year do white sharks occur, and do they return year by year?
2. In which area of the Basin do white sharks visit most frequently?
3. What is the size class of white sharks entering the area?

Methods

- Acoustic tagging data of white sharks were acquired:1330 detections between 2017 and 2020, involving 10 unique IDs.



- We used ggplot2 & GLATOS package in R studio to complete exploratory analysis. (6)(3)
- Residence time calculated (in seconds) during which the animal was detected in a specific area without a gap of at least one hour between detections
- Minas Basin was split into three regions: Passage, Basin, and Avon River.

Results

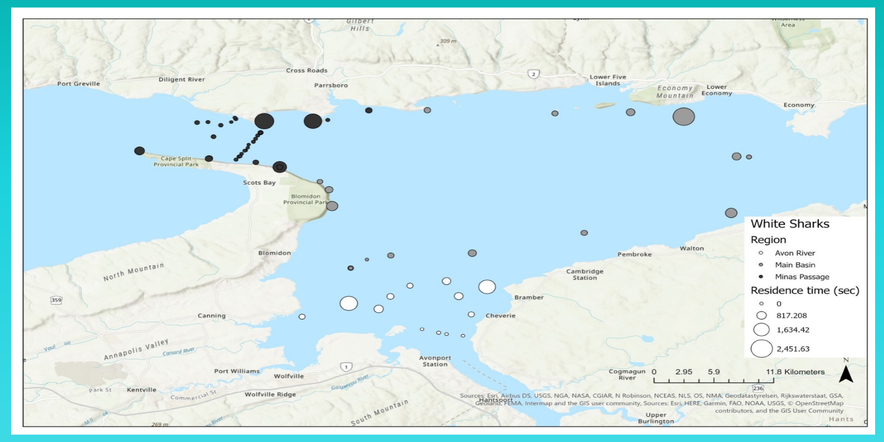


Figure 1 Map of the study site divided into three regions of interest, displaying the residence time in seconds of white shark detections at each receiver location.

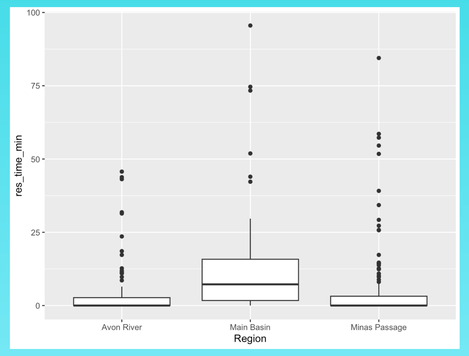


Figure 2 Box Plot displaying the residence time (min) of white shark detections in each region of Minas Basin.

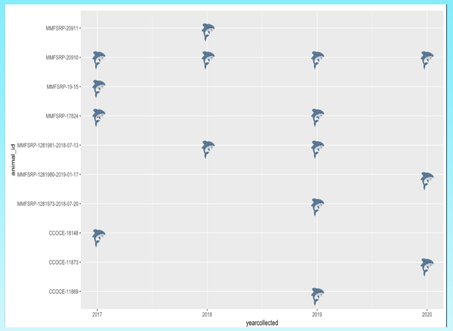


Figure 3 The 10 unique shark IDs and the corresponding years in which the individual sharks were detected.

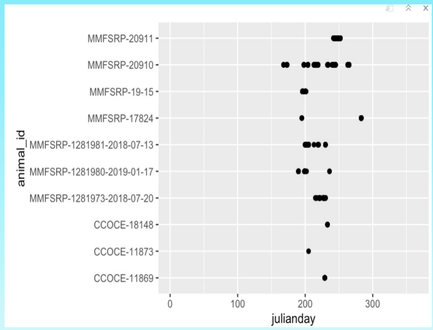


Figure 4 The 10 unique shark IDs and the corresponding Julian day of year in which individual white sharks were detected.

Conclusions

- White sharks are detected Minas Passage as they use this area as an entranceway, after which they disperse throughout Minas Basin.
- Some sharks return year after year, with detections most frequent during the warmer summer months and early fall.
- The area of the Basin with the highest residence time is the Main Basin, followed by the Avon River and then the Minas Passage.
- Potential risks are associated with direct collisions with turbines, exhibiting avoidance behavior, alterations in movement patterns, and/or changes in density (5).

- Work still needs to be done:
  1. Use age and growth estimates developed by Natanson et al. 2015.
  2. Add more recent data (2021-2023).

✓**Through enhancing our understanding of white shark habitat utilization aims to inform decisions regarding conservation and management, especially concerning the risks associated with the tidal power development plan.**

References

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(6) Wickham H. 2016. ggplot2: Elegant graphics for data analysis. https://ggplot2.tidyverse.org.