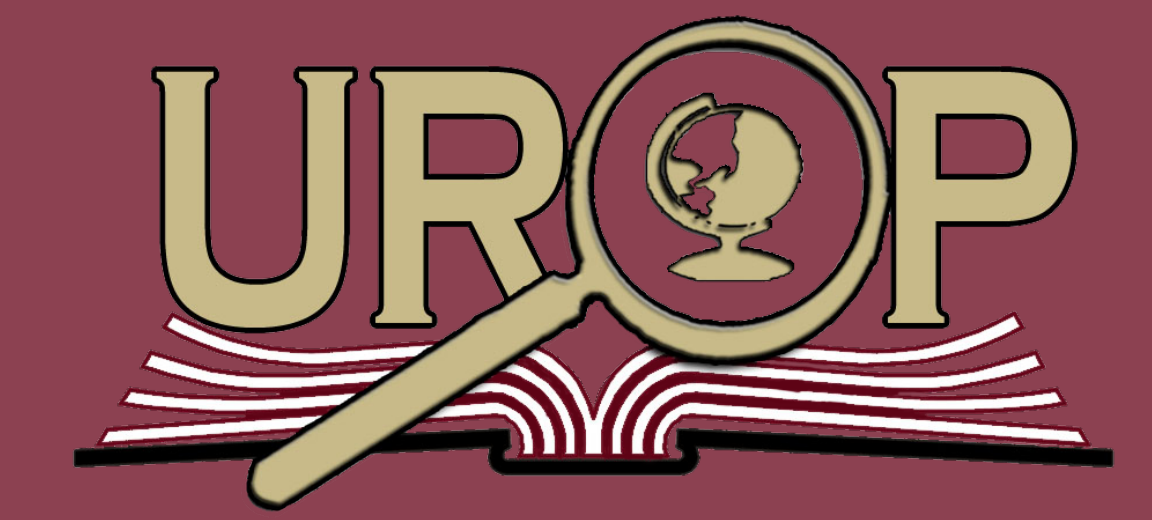




A Spatiotemporal Analysis of Fibropapillomatosis Presence in Green Sea Turtles (*Chelonia mydas*) at Crystal River, Florida



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Abstract

Among the risk factors for sea turtles in Florida, fibropapillomatosis (FP) is of relevance. FP is a viral, environmentally transmitted neoplastic disease that is often linked to Chelonid alphaherpesvirus 5 (ChHV5) and various environmental conditions, such as eutrophication events and coastal habitat degradation. Severe cases of FP are dangerous in turtles, as debilitating tumors can cause loss of mechanical functions and blindness, often leading to death (Aquirre & Lutz, 2004). This study investigates the spatiotemporal patterns of FP incidence among green turtles (*Chelonia mydas*) captured from 2016 to 2021 (N=113) in the relatively pristine Big Bend region near Crystal River, Florida. Our study will also evaluate tumors on captured green turtles based on criteria of size and location to characterize neoplastic growths. The results from this study will improve our understanding of FP prevalence for green turtles in Crystal River, which can then be compared against FP incidence in more degraded habitats across Florida.

Objectives

- Investigate incidence rates of FP among captured green turtle populations.
- Evaluate tumor severity by year and determine any trends.
- Evaluate any spatial present trends among turtles with FP visible.

Methods

- Green turtles were captured via rodeo method in Crystal River, FL from 2016 to 2021 and examined for FP
- A Balazs score (Balazs) was calculated for each turtle with FP, which accounts for tumor size as well as the degree of tumor proliferation
- The relationship between the Balazs score over time (years) was explored with a linear regression

Acknowledgments

This research was supported in part by the Florida Sea Turtle License Plate grant, Waterlust, and the National Academy of Sciences. We are thankful for all the support from members of the Marine Turtle Research and Ecology Group who helped with field work and sampling. The work was permitted by the National Marine Fisheries Service ESA Section 10(a) permit (#16733, #19496), Florida Fish and Wildlife Conservation Commission Marine Turtle Permit (MTP-243), Research and Monitoring Special Use permit for Chassahowitzka (#16011, #14002), and Florida Animal Care and Use Committee permit (ACUC #1524). Additional thanks are dedicated to Florida State University's Center for Undergraduate Research and Academic Enhancement, as well as the Undergraduate Research and Opportunity Program, for graciously providing travel funding, support, and guidance for this project.

Results

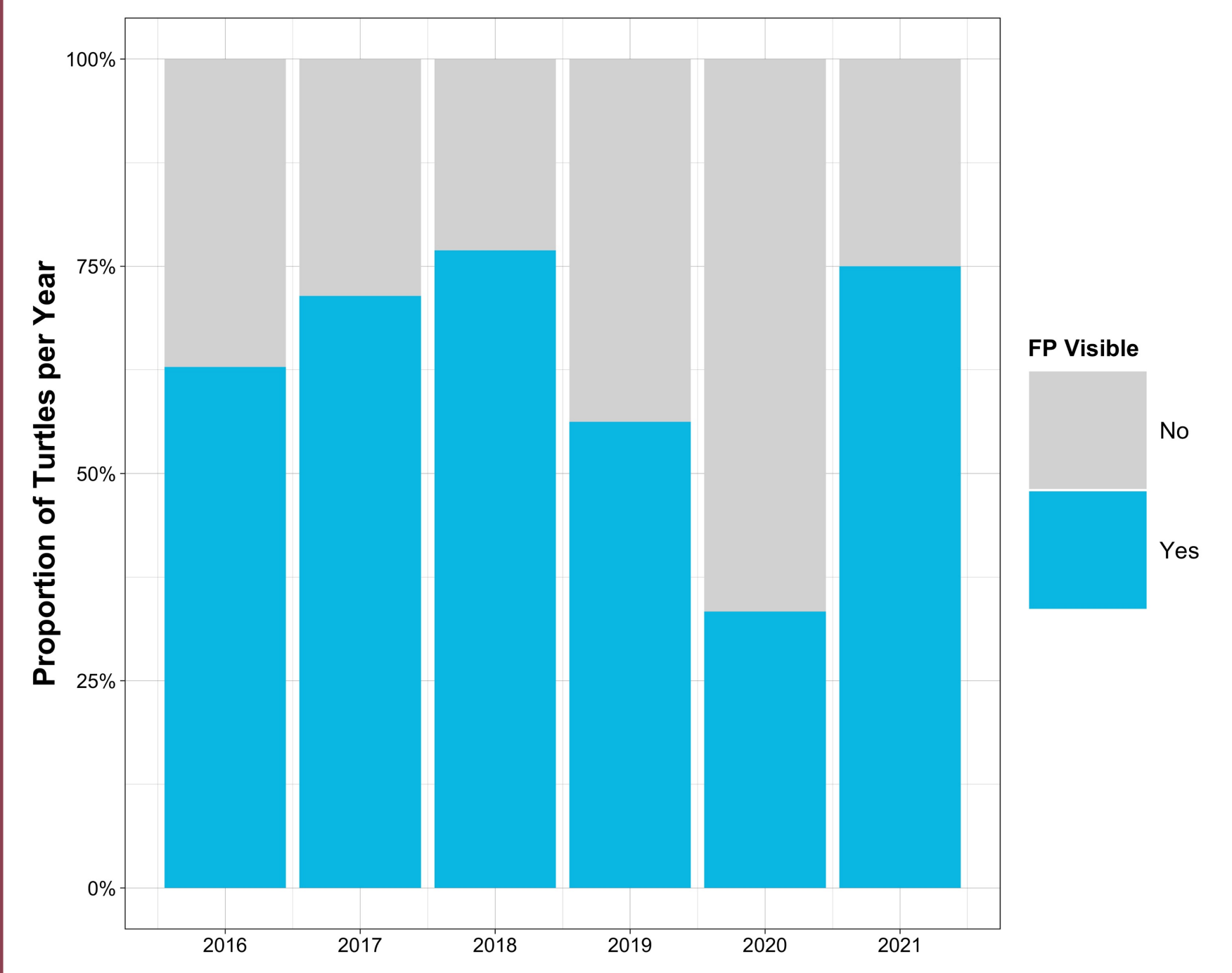


Figure 1. In all years except 2020, a majority (63.7%) of the green turtles sampled often had FP. In total, 72 of 113 sampled turtles showed visible signs of FP tumors.



Figure 2. Ocular tumors are typical among turtles with FP. In severe cases, tumors present on the eyes can greatly obscure or eliminate vision. In advanced cases of ocular tumor growth, survival is often reduced as it greatly impairs foraging ability, predator detection, and evasion of anthropogenic hazards.



Figure 3. These photographs show large tumor growth in often debilitating areas on the body. Neoplastic growths developing on the base of the fore and hind flippers can lead to limb immobility and dysfunction. This results in a significantly decreased ability to swim and forage.

Balazs Score Geospatial Distribution 2016-2021

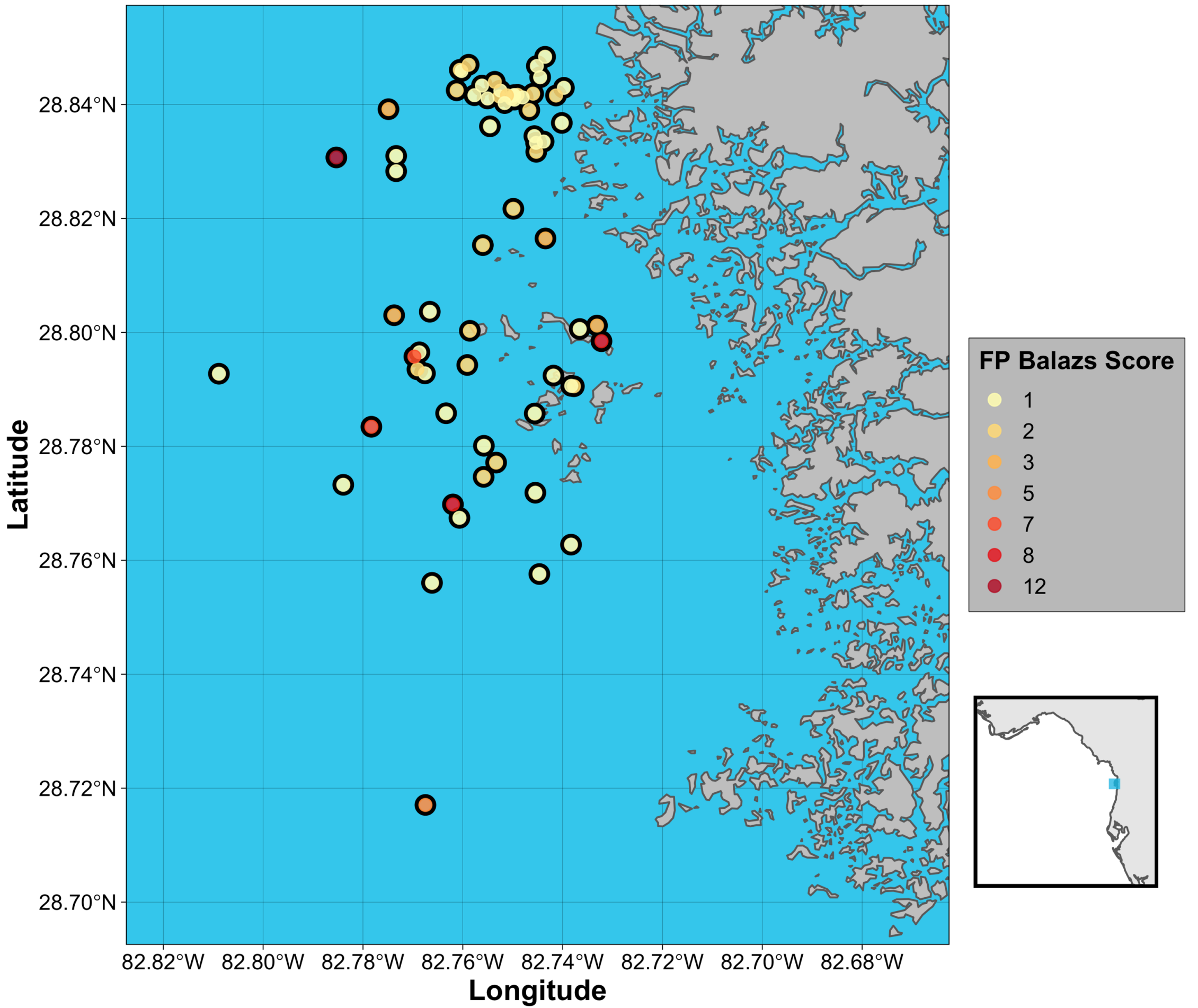


Figure 4. Green turtles were sampled along the Florida Gulf Coast near Crystal River. There appears to be no discernable trend between turtle location and Balazs score severity. Due to the relatively small sampling area and the high mobility of green turtles, it is unlikely that we will detect a spatial trend in the data.

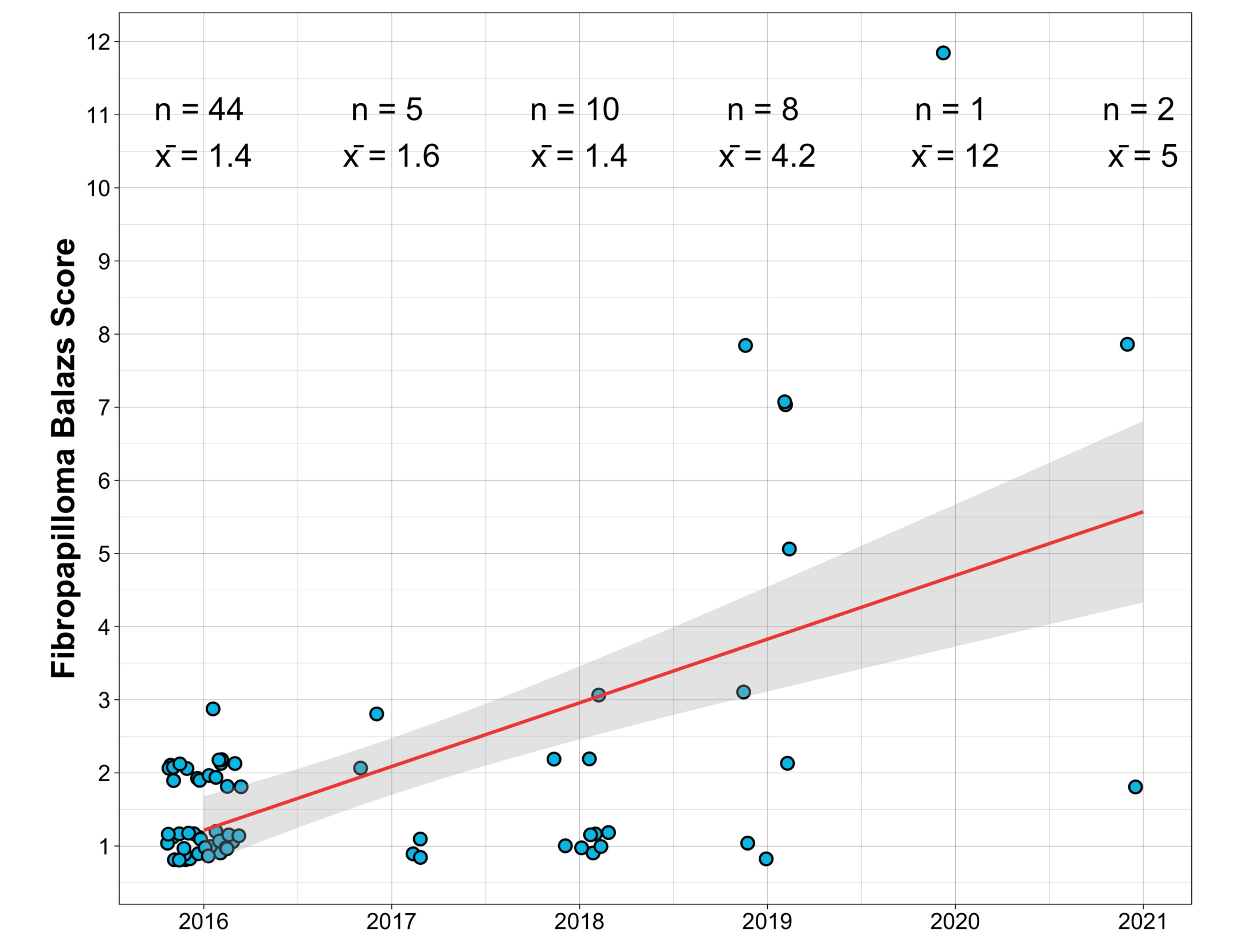


Figure 5. The linear regression depicts a positive correlation between sampling year and Balazs score severity. Turtles sampled in later years typically exhibited more severe cases of FP compared to those in earlier years. It is important to note that fewer sampling trips were conducted in 2020 and 2021 due to the COVID-19 pandemic. Points have been slightly jittered along both axis dimensions to improve the visibility of all points per year.

Conclusion

- Despite sample size limitations in more recent years, there appears to be a positive relationship between years and Balazs score
- In all years except 2020, more turtles were reported with visible FP tumors than otherwise
- We could not determine whether there were spatial trends in FP incidence and severity due to the high mobility of green turtles

Future Directions

- Trends between turtle size and tumor size/locations, and their relation to environmental factors
- Expanding the spatial scope by incorporating green turtle datasets in the Bahamas, which would likely represent a geographically distinct sub-population

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