



Evaluation of Boat Strike Injuries on River Cooters (*Pseudemys concinna*) with Emphasis on Demographic Variation

S. Arigue, D. Muegge, J. Miller, J. Bessette
Santa Fe College



Introduction

- Motorized vehicles and vessels are known to cause injuries to wildlife. (Lima et al 2015)
- Boat strikes are a common injury in aquatic turtles and can life threatening (Cecala, 2009; Heinrich et al, 2012)
- A long-term turtle population monitoring program, on the Santa Fe River (Fig. 1), has identified boats and boat related injuries as a possible threat to river cooter (*Pseudemys concinna*) survivorship.
- Our goal is to identify if one of the sexes is more prone to boat strike injuries. We hypothesize that female river cooters would be more prone to boat strikes due to their larger body size (Kornilev et al. 2010).
- Finally, we want to identify if there is a directional pattern of boat strikes injuries (turtle orientation to boats), to which the turtles would be more susceptible. We hypothesize that posterior injuries would be more prevalent.

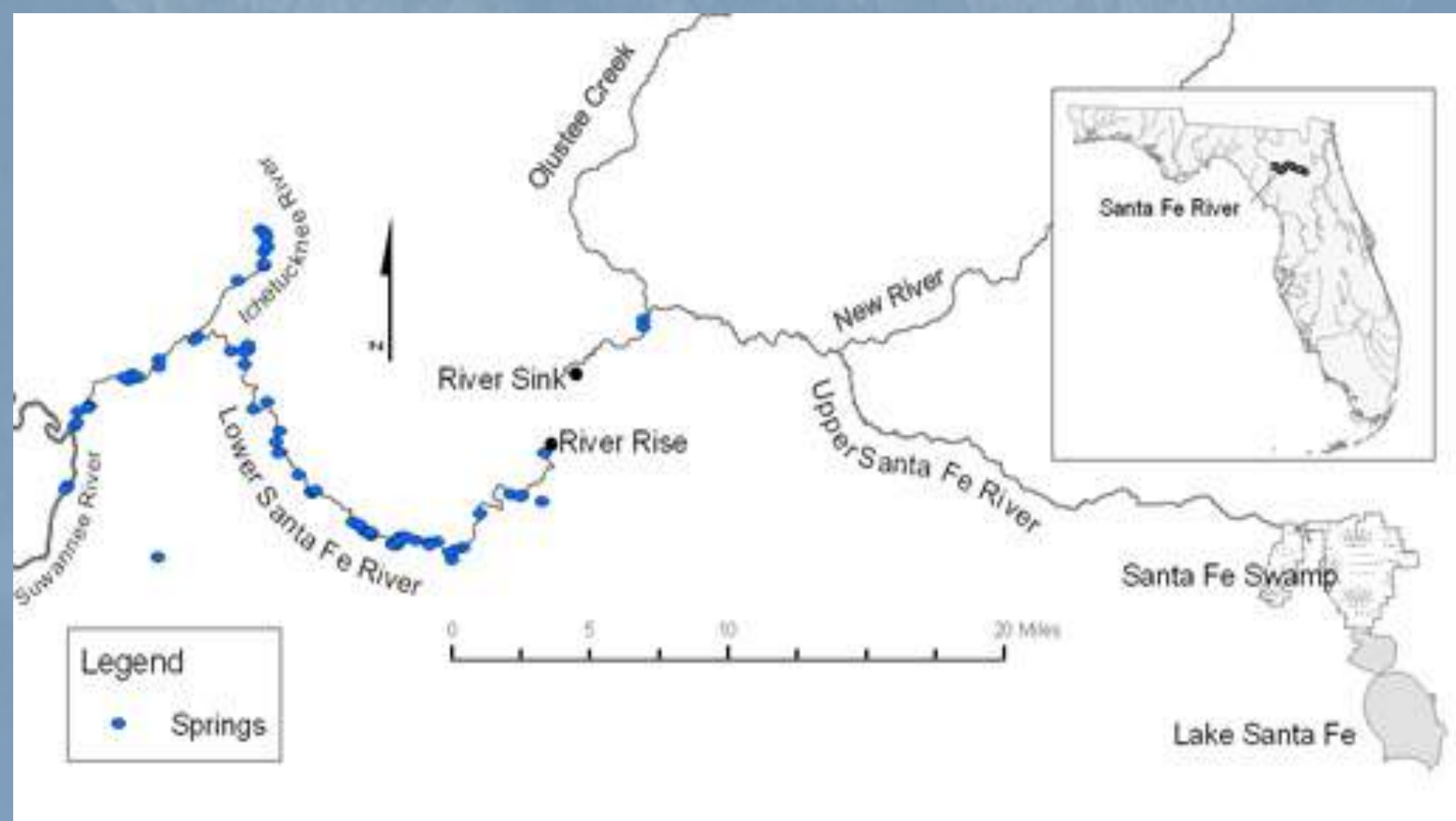


Figure 1. Map of the Santa Fe River

Methods

- We reviewed data from a long-term mark recapture study (2004 - present) for incidence of boat strike injury.
- The study was conducted from Poe springs to Ginnie springs.
- These data points included sex and maturity later used to determine demographic effects.
- Only data from female and male river cooters were used from 2009 to 2022. We did not include juvenile river cooters.
- Data included descriptions of the boat strike injuries including location of the damage.
- We developed an additive scoring system of boat strike damage using shell and limb injuries (Fig. 2).

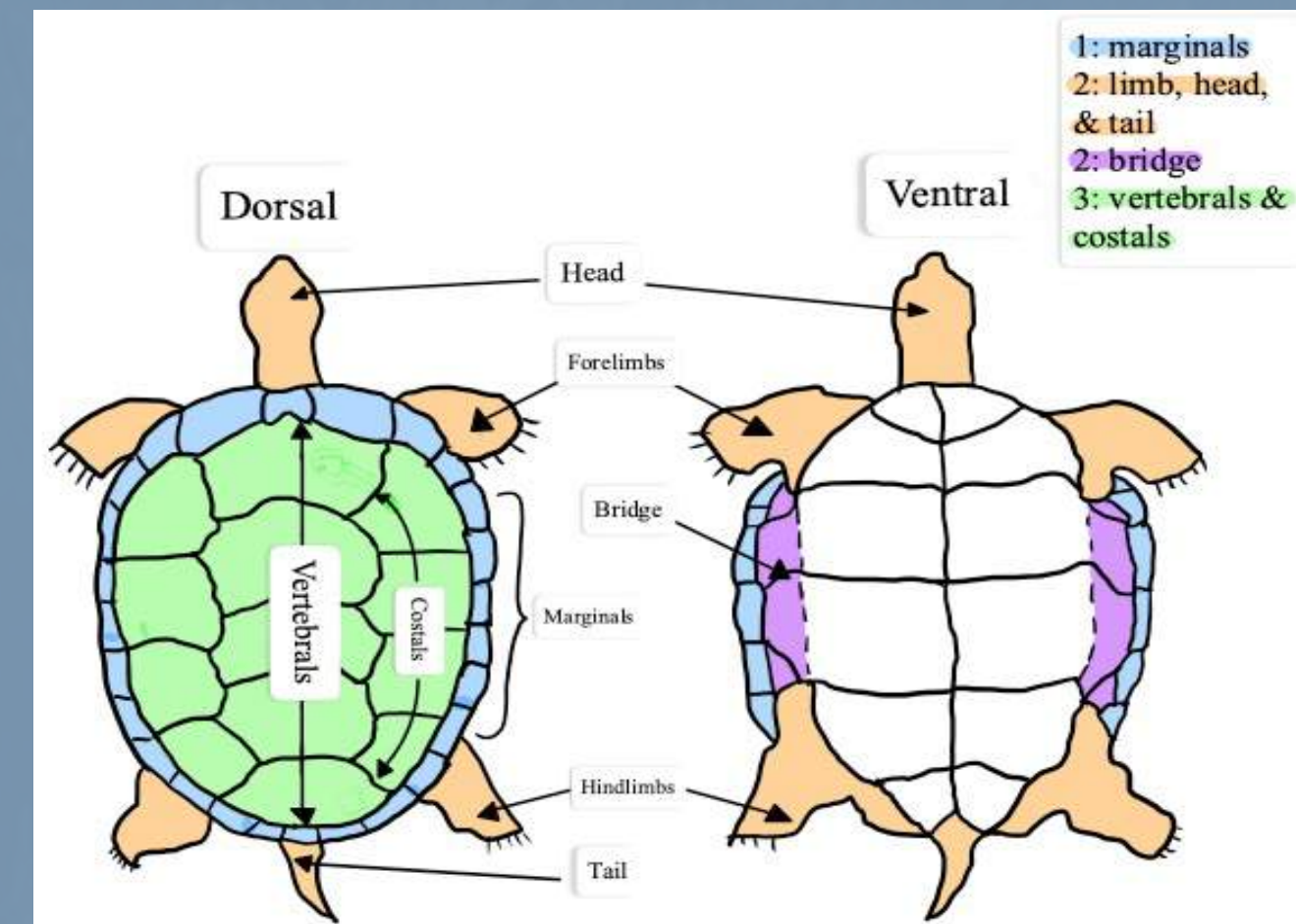


Figure 2. (Left) Scoring system developed to quantify boat strike injuries. Marginal scutes were 1 point, limb and bridge injuries are 2 points, and vertebral and costal scutes are 3 points. Injury points were additive with more severe injuries garnering high scores.

Figure 3. (Middle) An adult male river cooter (*P. concinna*) with no boat strike injuries.

Figure 4. (Right) An adult female river cooter (*P. concinna*) with a score of 6, (missing hindlimb, posterior marginals, and posterior costals scutes).

Results

- A total of 1817 adult *P. concinna* were recorded in the Santa Fe River. The population exhibited a slight female bias with 978 females and 839 males.
- A total of 292 adult *P. concinna* exhibited prop scar damage. 164 of the injured turtles were female (16.77%) and 128 of the injured turtles were male (15.26%).
- The scoring scale is from 1 to 9.
- Distribution of scores (1-9):
 - 59.59% of turtles obtained a score of 1.
 - 9.59% of turtles obtained a score of 2.
 - 16.78% of turtles obtained a score of 3.
 - 10.62% of turtles obtained a score of 4.
 - 2.40% of turtles obtained a score of 5.
 - 1.03% of turtles obtained a score of 6.
 - No turtles reported scored above a 6.
- A total of 116 turtles displayed anterior injuries.
- A total of 213 turtles displayed posterior injuries.

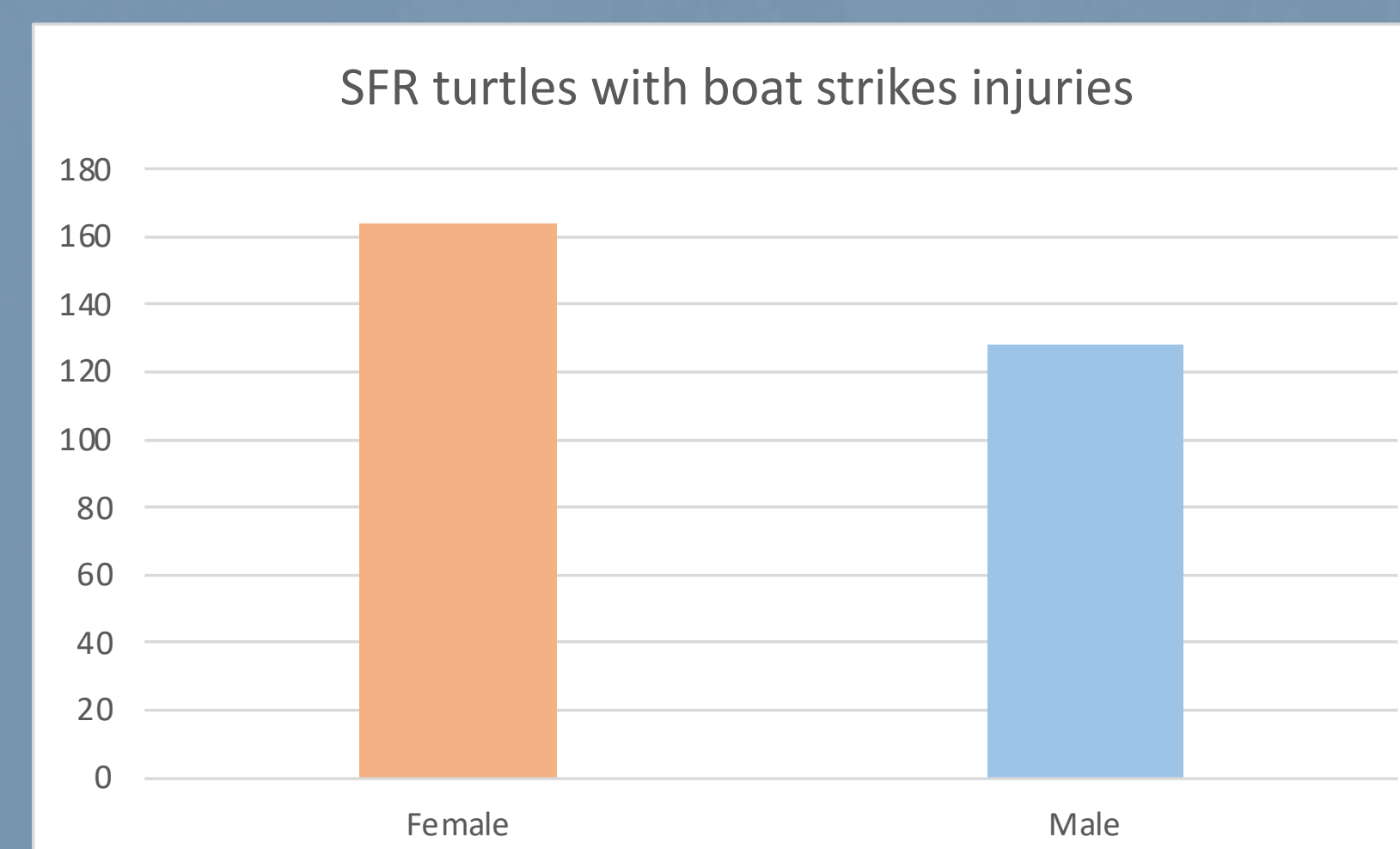


Figure 5. *Pseudemys concinna* reported with boat strike injuries separated by sex.

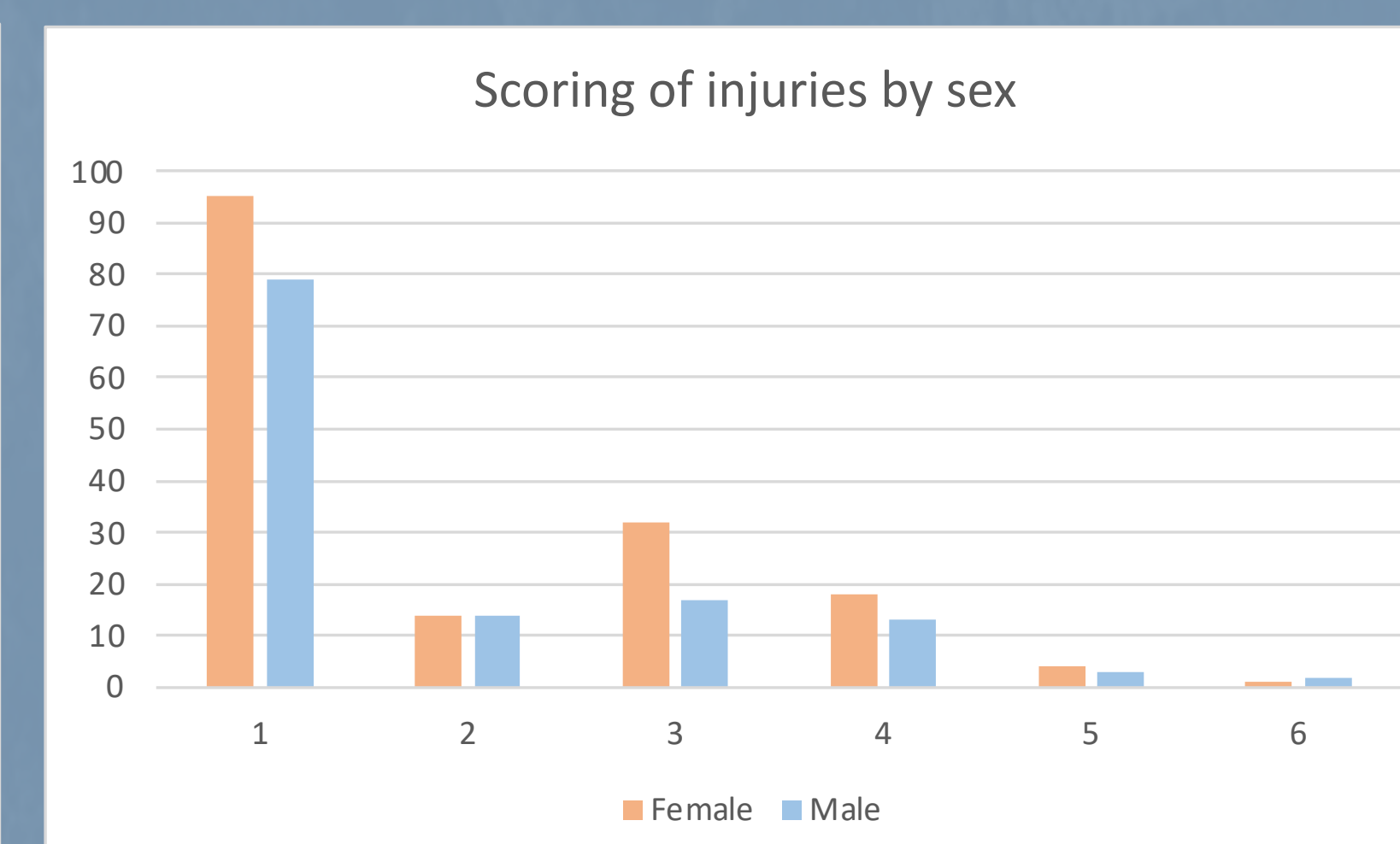


Figure 6. Distribution of the scores among the sexes.

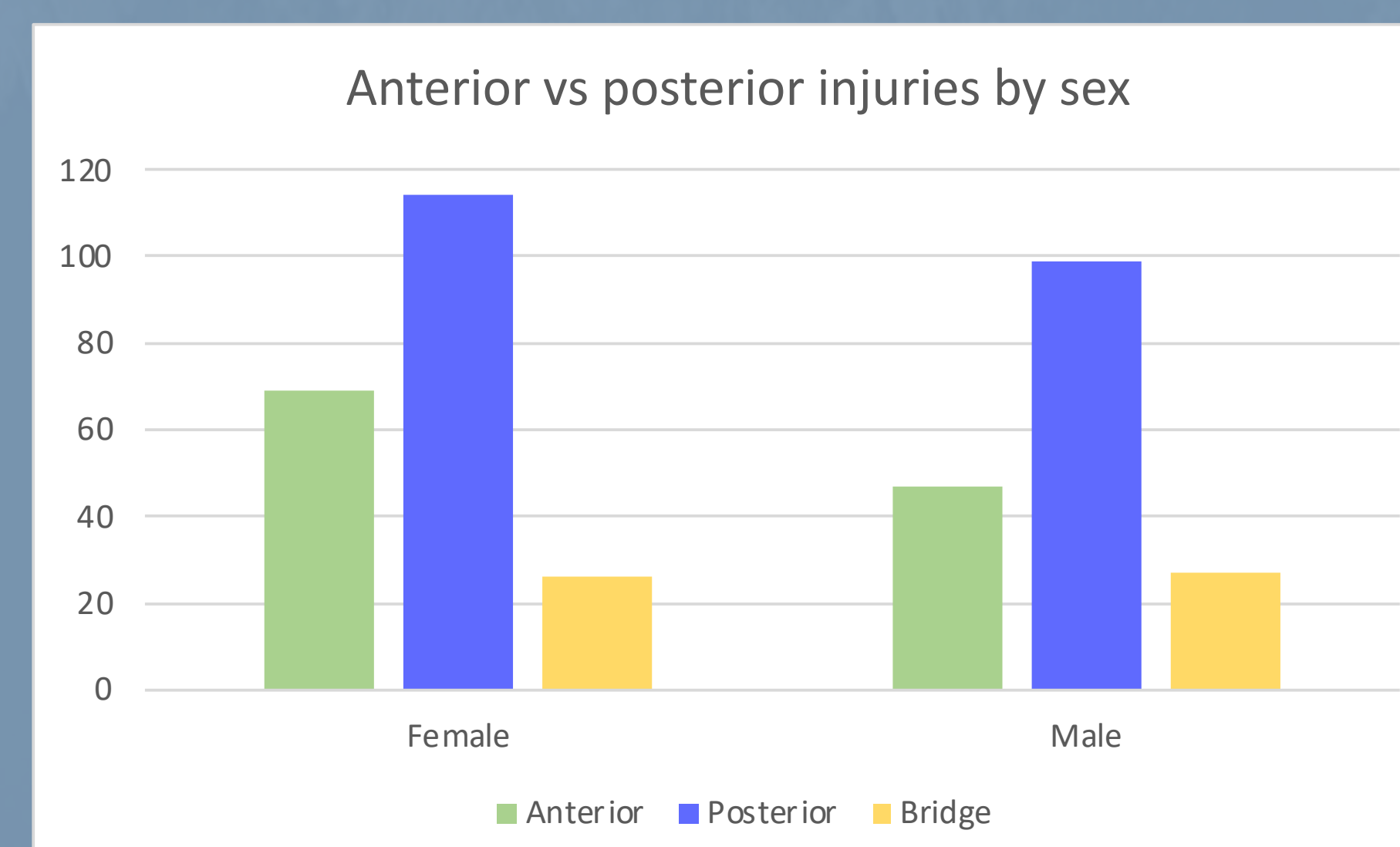


Figure 7. Distribution of boat strike injuries by sexes based on directional pattern.

Discussion

- The study detect no difference between sexes in report of boat strikes injuries. 16.77% of female river cooters and 15.26% of male river cooters.
- Females are larger making them a bigger target but males are likely to move more and come in contact with vessels more frequently.
- In some turtles direction could not be determine because they exhibited anterior and posterior boat strike injuries.
- Future studies should improve scoring scale to assess injuries more accurately to include plastron injuries and make a distinction between vertebrals and costals scutes injuries.
- Additionally, we are interested in exploring how movement patterns of the river cooters correlates with boat strike injuries prevalence.

Acknowledgments

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