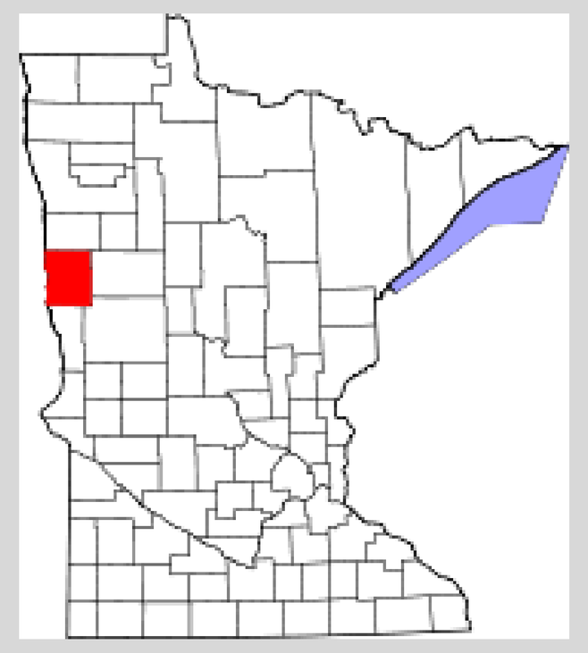
Comparison of Time-interval from Initial to Most Recent Capture by Size Class and Sex in a Long-term Study of Painted Turtles (*Chrysemys picta bellii*) in Clay County, Minnesota



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Abstract

In a long-term study that began in 2001, western painted turtles (*Chrysemys picta bellii*), have been live-captured in three separate sloughs near Rollag, Minnesota, utilizing floating/basking traps in an effort to study population dynamics and behaviors. Once captured, measurements including weight, plastron length, carapace length/width/curvature, and sex were recorded. To identify re-captured turtles, PIT tagging and notching were utilized in adults and juveniles had their carapace painted with distinguishing symbols. Our research focus here is to compare the time-interval (in years) from initial capture to the most recent capture by size class and sex of the western painted turtles. PIT tagging was not implemented until 2006, so our study will only include turtles that were PIT-tagged between 2006 and 2019 and were captured in more than just one year. We want to see if the average time span in years varies between males and females and also between size classes. We hope our study sheds some light on longevity/survival in painted turtles in northern climates and if size and/or sex plays a role.

Introduction

Since 2001, this ongoing study has been live-trapping painted turtles in an effort to study their population characteristics and behaviors. Temperature is a major environmental cue for the painted turtles' breeding season which occurs around late spring and continues until early summer. Although most individual turtles in a population do not live longer than just a few years, studies have confirmed that turtles, even smaller species, have been known to have high potential longevities in natural populations if a stable age distribution is achieved (Gibbons, 1987). Male painted turtles mature at about 7.0 to 9.5 cm (≈ 3 to 5 years of age) and females mature at about 10.0 to 13.0 cm (≈ 6 to 10 years of age) (Knipper, 2002). This extended juvenile phase allows the turtles to have an extended period of rapid growth while developing, thus the adult is larger than if it had matured more rapidly (Gibbons, 1987). The larger size of the adult turtle, as well as its shell, will help in protecting it against predators and other environmental risks while migrating or nesting. We are investigating if sex and size class are associated with the span of number of years the painted turtles in our study were captured.

Hypotheses

Null Hypothesis:
There will be no difference between the male and female time-interval from initial to most recent capture by size class.

Alternate Hypothesis:
There will be a difference between the male and female time-interval from initial to most recent capture by size class.

Methods

Our dataset included painted turtles that were PIT-tagged (Passive Integrated Transponder) and recaptured (2 or more years) during the months of May-August between the years of 2006 and 2019. Live basking traps were located in three neighboring sloughs: Stockrahm, Middle, and Aakre (Figure 5). There were six traps located in each Aakre and Stockrahm Sloughs, and, starting in 2011, three traps in the Middle Slough. Once turtles were captured, their measurements were recorded including: weight, plastron length, carapace length/width/curvature (Figure 1), and sex. From our raw dataset, the PIT-tagged turtles with more than 1 year of capture were sorted by sex. Then we focused on the carapace length and placed them into size classes of interest: 10.1-13 cm, 13.1-16 cm, 16.1-19 cm, and 19.1+ cm.

Figure 1. Measuring carapace length of *Chrysemys picta bellii* with calipers.

Results

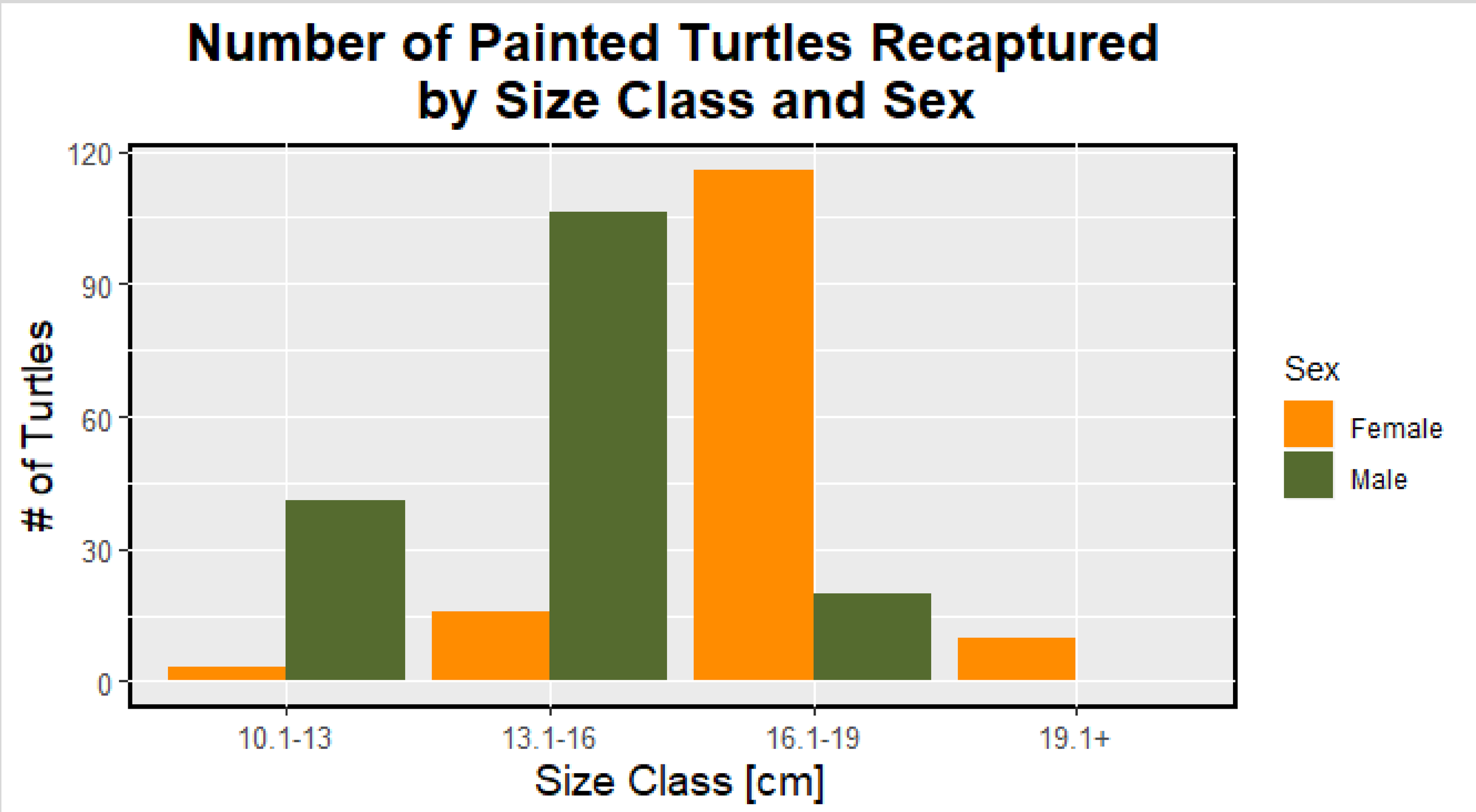

Figure 2. Graph displays total number of turtles recaptured between 2006-2019 separated by sex and size class (carapace length in cm). Female n=145, Male n=167, Total = 312

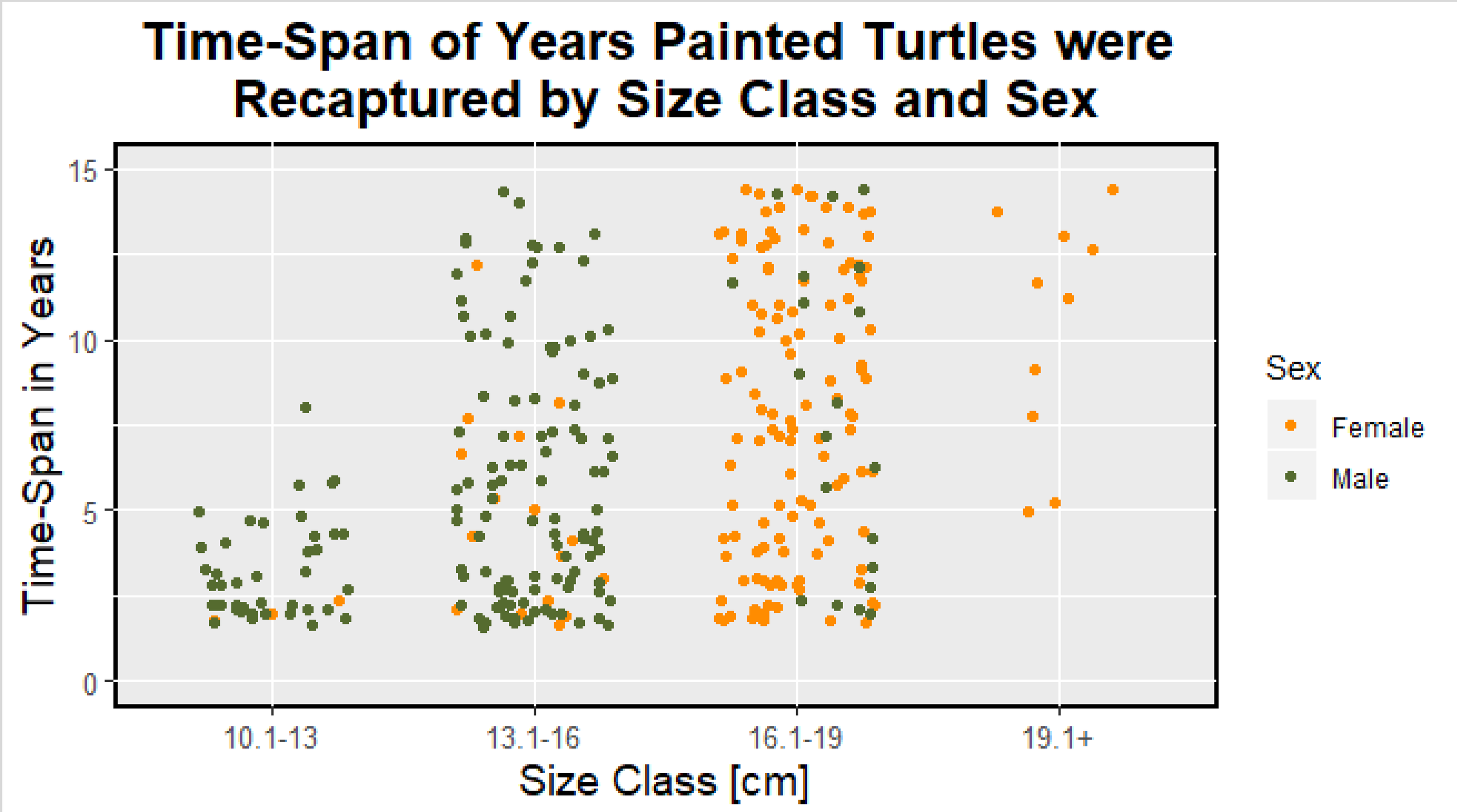

Figure 3. Graph displays time-span of years each turtle was recaptured between 2006-2019. Turtles separated by sex and size class (carapace length in cm). Female n=145, Male n=167, Total = 312

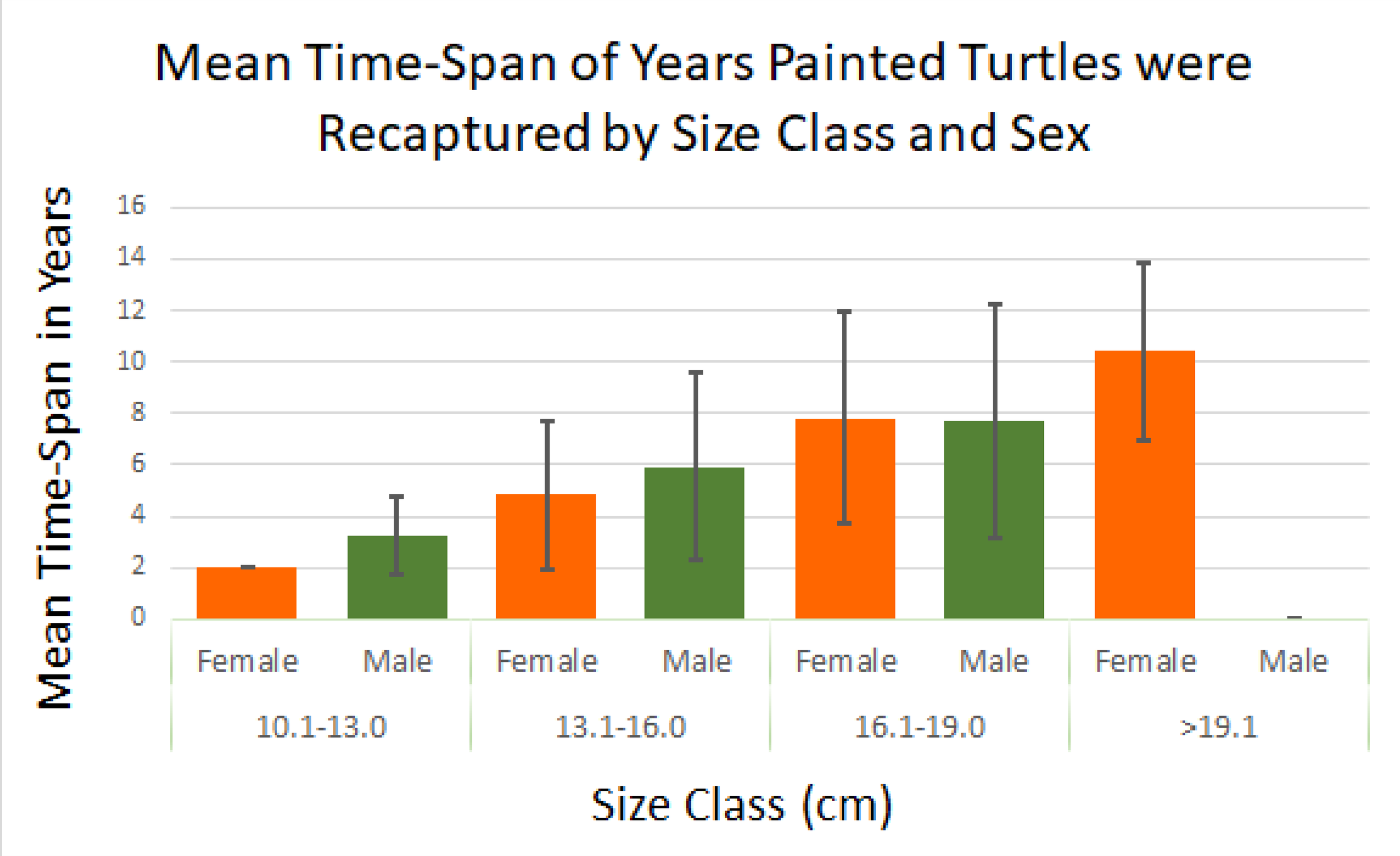

Figure 4. Graph displays the mean number of years of recapture between 2006-2019 for both male and female painted turtles in each size class of interest. Error bars indicate the variation in the recorded years for individual turtles within each size class & sex. T-tests were calculated for each size class comparing years of recapture between males and females. Size class '10.1-13.0 cm' showed a p-value <0.05 which tells us they are significantly different. T-test results for size classes '13.1-16.0 cm' and '16.1-19.0 cm' showed there was no significant difference with a p-value >0.05. Size class '>19.1 cm' had no males present so no t-test was performed.

Study Sites

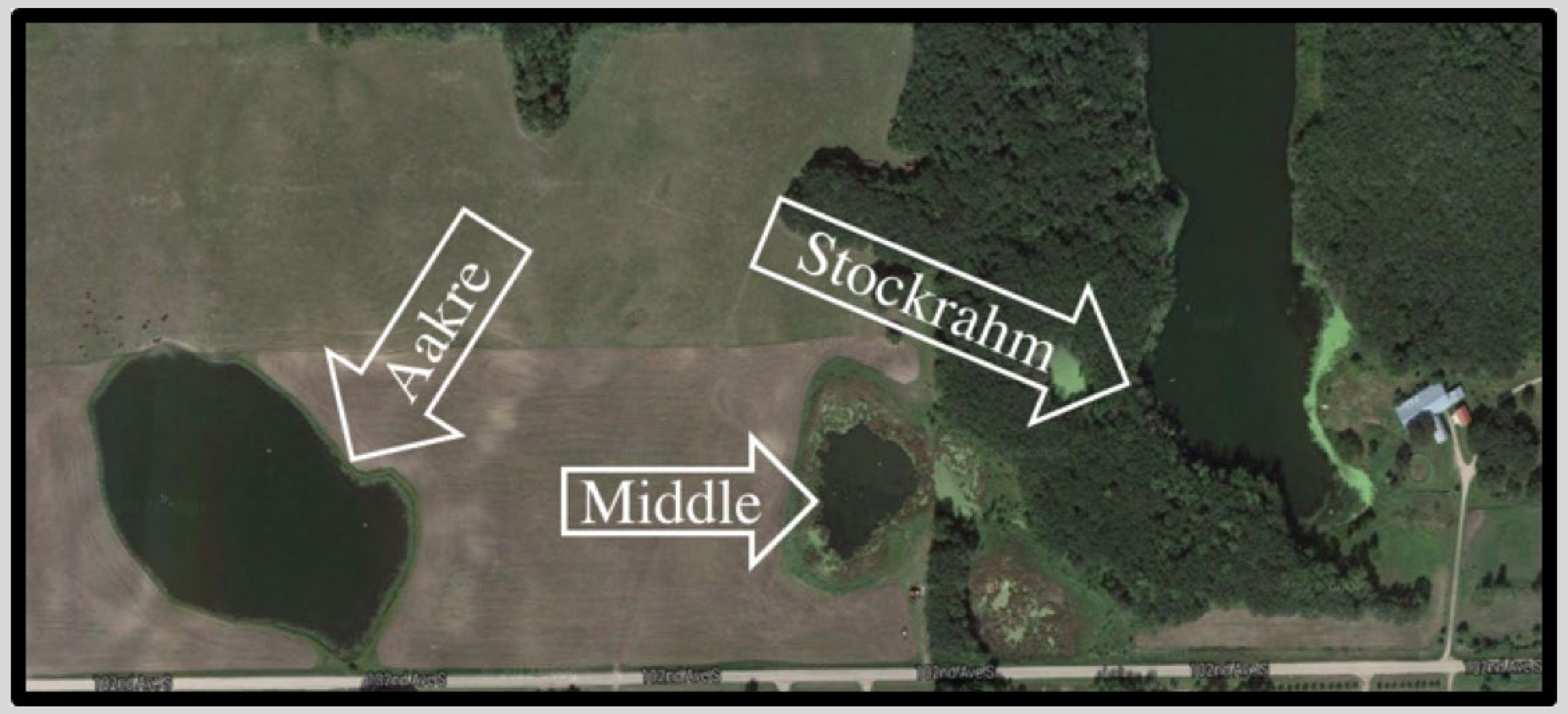

Figure 5. Aerial view of Aakre, Middle, and Stockrahm Sloughs, located in Clay County, MN.

Results (continued) & Discussion

Carapace length for 312 painted turtles (145 females, 167 males) were utilized for our analysis. Size classes '10.1-13 cm' and '13.1-16 cm' showed a much higher male count of turtles recaptured, size class '16.1-19 cm' had a much higher female count, and size class '19.1+ cm' showed no count for males (Figure 2). These results are consistent with the known female-biased sexual size dimorphism that is linked to fecundity advantage in this species of freshwater turtle (Litzgus and Smith, 2010). Previous research has shown that individual turtles within freshwater turtle populations have varying growth rates that contribute to a large range of adult body sizes (Rowe, 1997). Our data analysis seemed to agree with the large variation in adult body sizes (Figure 3) because it showed that, within each size class, there were turtles that had a minimum known age of anywhere between 2-14 years. Warmer and cooler environments have a great impact on food consumption and rate of growth for freshwater turtle species, both male and female, so even aquatic sites within small geographic areas can have individual turtles with great variance in their growth rate and body size (Bury and Germano, 2009). Although we thought that females would have a shorter time-interval due to encountering more risks than males during nesting periods (i.e., exposure to predators, heat stress, etc.) (Refsnider et al. 2015), our t-test results showed that when comparing the mean time-span of years of recaptures there was only a significant difference between the sexes within the '10.1-13 cm' size class (Figure 4) and all other size classes supported our null hypothesis that there will be no difference in the time-interval from initial to most recent capture by size class and sex. With further analysis and study, we might be able to link a higher rate of survivorship with one of the sexes within size classes, but there are many factors that would have to be considered, such as migration patterns/relocation to other sloughs, predation presence, weather anomalies, etc. We hope our study helps in providing a model for further research studies who seek to better estimate survivorship based on sex and size class.

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