Demography of alligator snapping turtles (*Macrochelys temminckii*) across a fishing pressure gradient

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Photo by Sarah Fuller

Introduction

Demographic data are necessary to predict population responses to environmental and anthropogenic stressors and inform conservation efforts for declining species (Weimerskirch 2018, *J. Wildl. Manag.*).

The western alligator snapping turtle (*Macrochelys temminckii;* hereafter AST; Fig. 5) is the largest species of freshwater turtle in North America and is being considered for Federal listing as a Threatened Species under the Endangered Species Act (Federal Register 2021). Notably, there is a lack of demographic data of AST in Texas.

Passive fishing gear (i.e., trotlines) have been identified as a pervasive threat to AST populations, although this threat has yet to be quantified in Texas (Steen and Robinson 2017, *Conserv. Biol.*).

The purpose of this project is to examine the demography of Texas AST populations in habitats of varying intensities of passive fishing pressure. We hypothesize lower density estimates (Fig. 2), smaller body sizes (Fig. 3), and a near equal proportion of subadult and adult ASTs (Fig. 5) in habitats subjected to passive fishing gear.

Methods

We will trap for AST across three sites within Nacogdoches County, TX. The study sites are to be determined.

Baited hoop nets (n=15) will be deployed for one trap night at each site, weekly, from May-August 2023 and May-August 2024 (Fig. 1). Additionally, each site will be trapped for one trap night each month from September 2023-April 2024.

Across each study site, selected individuals (n=30) will be fitted with transmitters to quantify their presence in a site during each survey period. These data will be incorporated into estimates of population density.

For all caught individuals, we will record age class, sex, weight, and morphological measurements.

Passive fishing gear surveys will be conducted at both fished study sites to quantify fishing pressure intensity.


Photo by C.M. Schalk

Fig. 1: Deploying a hoop trap to survey for ASTs at Alazan Bayou WMA.

Expected Results

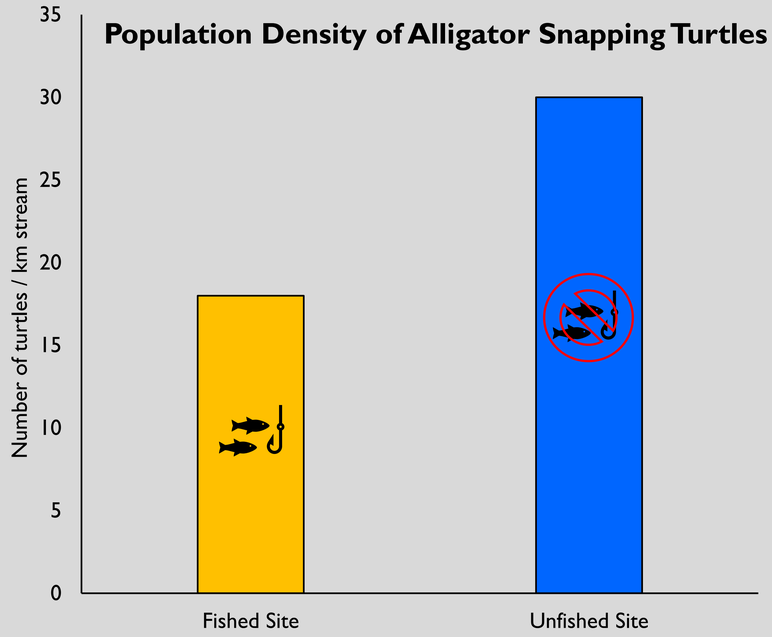

Fig. 2: The expected population density of ASTs in a fished and unfished site. We hypothesize lower densities in sites subjected to passive fishing pressure. Howey and Dinkelacker (2013, *Copiea*) estimated 14 ASTs/ km stream in a historically harvested population. In contrast, Riedle et al. (2008, *Chelonian Conserv. Biol.*) estimated 28-24 AST/ km stream in a non-harvested population. Additionally, both Rudolph et al (2002, *TPWD*) and Rosenbaum et al. (2023, *Southeast Nat.*) recorded lower catch per unit effort (CPUE) of AST at sites with passive fishing gear present in Texas.

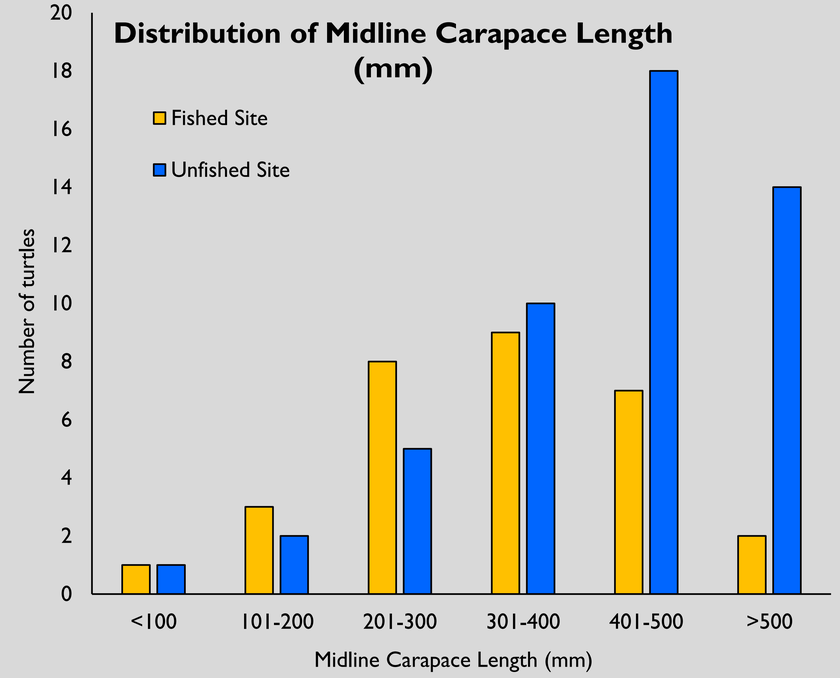

Fig. 3: The expected distribution of mean midline carapace length (mm) of ASTs across the three study sites. Based on the results of Rudolph et al. (2002, *TPWD*), we hypothesize smaller carapace lengths subjected to passive fishing pressure.

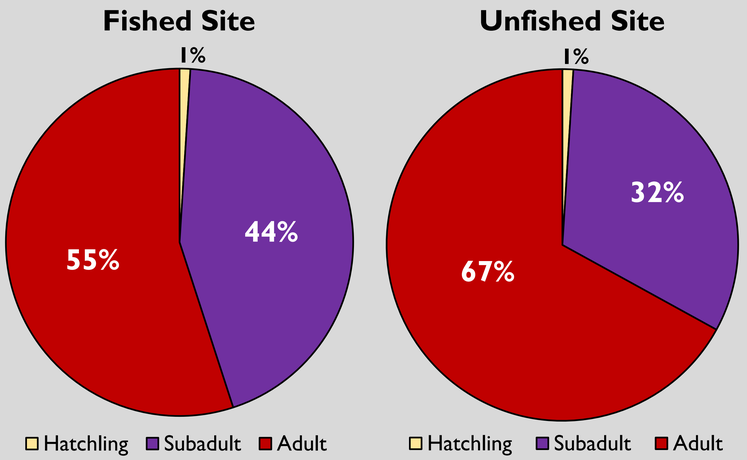

Fig. 4: The expected age structure of AST populations in sites with and without passive fishing pressure. Howey and Dinkelacker (2013, *Copeia*) found an age class ratio of 1.2 adult: 1 juvenile in a historically harvested population. In contrast, Folt et al. (2016, *Herpetol. Monogr.*) found an age class ratio of 1.9 adult: 1 juvenile in a recovered AST population.

Discussion

Based on previous studies, we expect lower population densities, smaller body sizes, and an absent left-skewed age structure of ASTs in habitats subjected to passive fishing pressure. These results would show the threat passive fishing gear imposes on the stability of AST populations.

The data gathered from this study will aid in our understanding of AST populations in Texas. This information is necessary for developing a successful conservation plan for this species at both the state and federal level.


Photo by James Childress

Fig. 5: Photo of an AST individual in east Texas.

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