Population Estimate of Urban Eastern Gray Squirrels in Schmeeckle Reserve, WI

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Introduction & Hypothesis

- Eastern gray squirrels occur in high densities in forested urban environments which can create wildlife human conflict (1).
- Our goals where to 1) calculate an urban population estimate of gray squirrels in Schmeeckle Reserve, Stevens Point, WI and 2) investigate environmental variables that influence trap success and gray squirrel activity.
- We hypothesize that gray squirrel activity and trapping success will increase on days with higher temperatures, anticipating a similar population estimate in 2021 with numerous recaptures.

Figure 1: A set and baited Tomahawk live trap.

Figure 2: An eastern gray squirrel in a Tomahawk live trap.

Methods

- Tomahawk live traps (Figures 1 & 2) were baited with peanut butter and oats (2) and used to trap squirrels in a grid pattern (3) placed in the Chilla Woodlot and Berard Oaks of Schmeeckle Reserve.
- Traps were opened and baited at 6am, checked at 9am, 12pm, and closed at 3pm through late-February to mid-March (4).
- Captured squirrels were placed into a handling cone (Figure 4) where sex, weight, and age (5) (Figure 3) were determined and given an ear tag for identification (Figure 5).
- We used Huggins' closed capture with individual random effects module in Program MARK (6) to estimate squirrel abundance (Table 1).

Results

- Time of day and temperature influenced probability of capture whereas sex, site, cloud cover, and weight were not significant (Table 1).
- Highest likelihood of capture was at 9am (Figure 6).
- 47 individuals were trapped (9 Berard Oaks, 38 Chilla Woodlot).
- Abundance estimates are as follows:
  - Females in Berard Oaks: N= 2 (95% CI: 1 to 11)
  - Males in Berard Oaks: N= 19 (95% CI: 12 to 40)
  - Females in Chilla: N= 19 (95% CI: 12 to 40)
  - Males in Chilla: N= 72 (95% CI: 49 to 122)

Figure 3: Age is determined by spreading fur on the hind leg to count buffy colored rings.

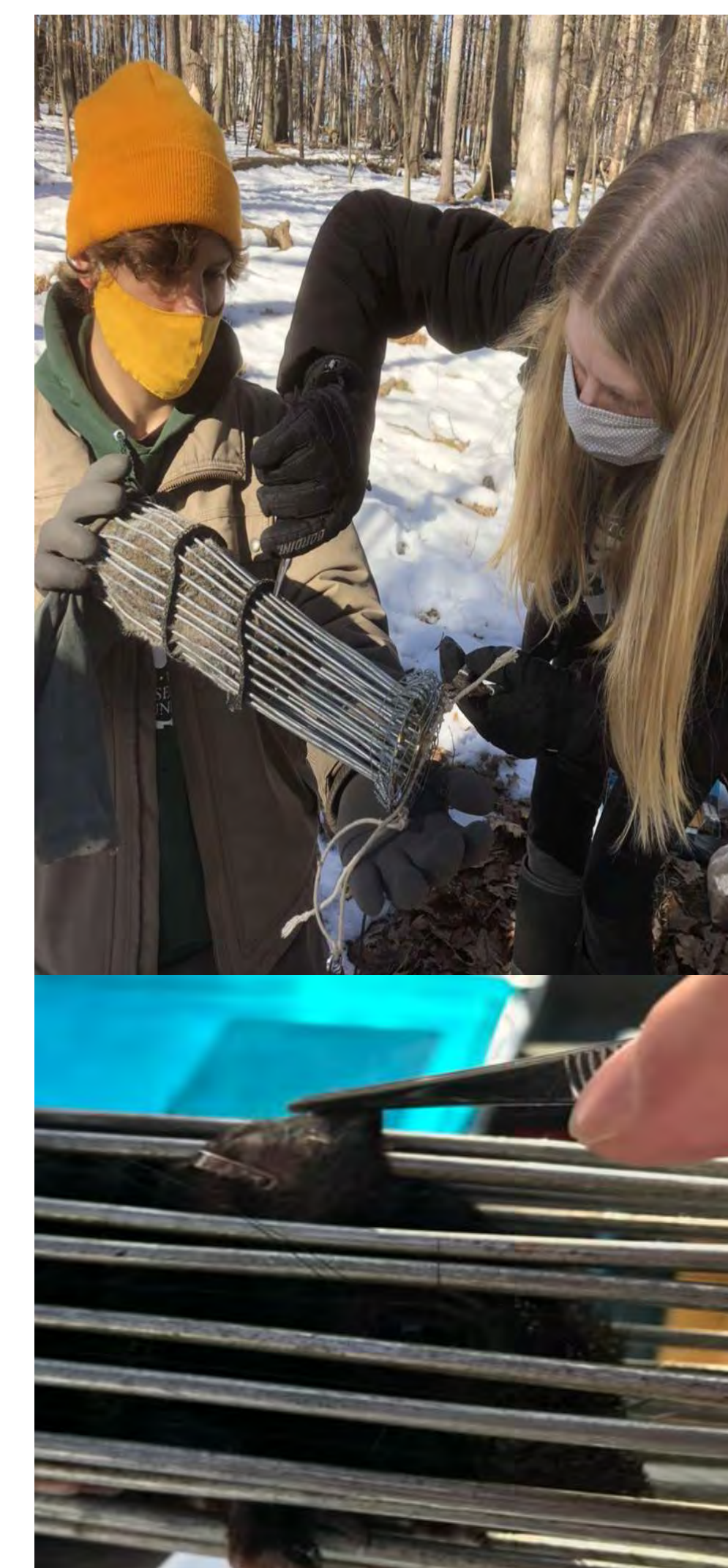**Figure 4:** An eastern gray squirrel is contained in the handling cone.

Figure 5: Metal ear tags are applied using pliers.

Table 1. Model selection table of hypotheses about capture probability from Huggins' closed capture with individual random effects analysis to estimate squirrel abundance at Schmeeckle Reserve, Wisconsin during February-March 2021.

Model	AICc	Delta AICc	AICc Weights	Model Likelihood	Num. Par	Deviance
p(TOD+temp) c(=p)	427.0616	0	0.99965	1	4	419.0379
p(TOD) c(=p)	445.2595	18.1979	0.00011	0.0001	3	439.2453
p(TOD) c(TOD)	446.1421	19.0805	0.00007	0.0001	6	434.0923
p(TOD+weight) c(=p)	446.6215	19.5599	0.00006	0.0001	4	438.5978

*p= capture probability, c= recapture probability, site=Chilla or Berard Oaks, weight= body mass at capture, sex = female or male, TOD = time of day trap check occurred (9am, 12pm, 7pm), temp = degrees F at time of trap check, cloudcov = percent cloud cover at time of trap check.
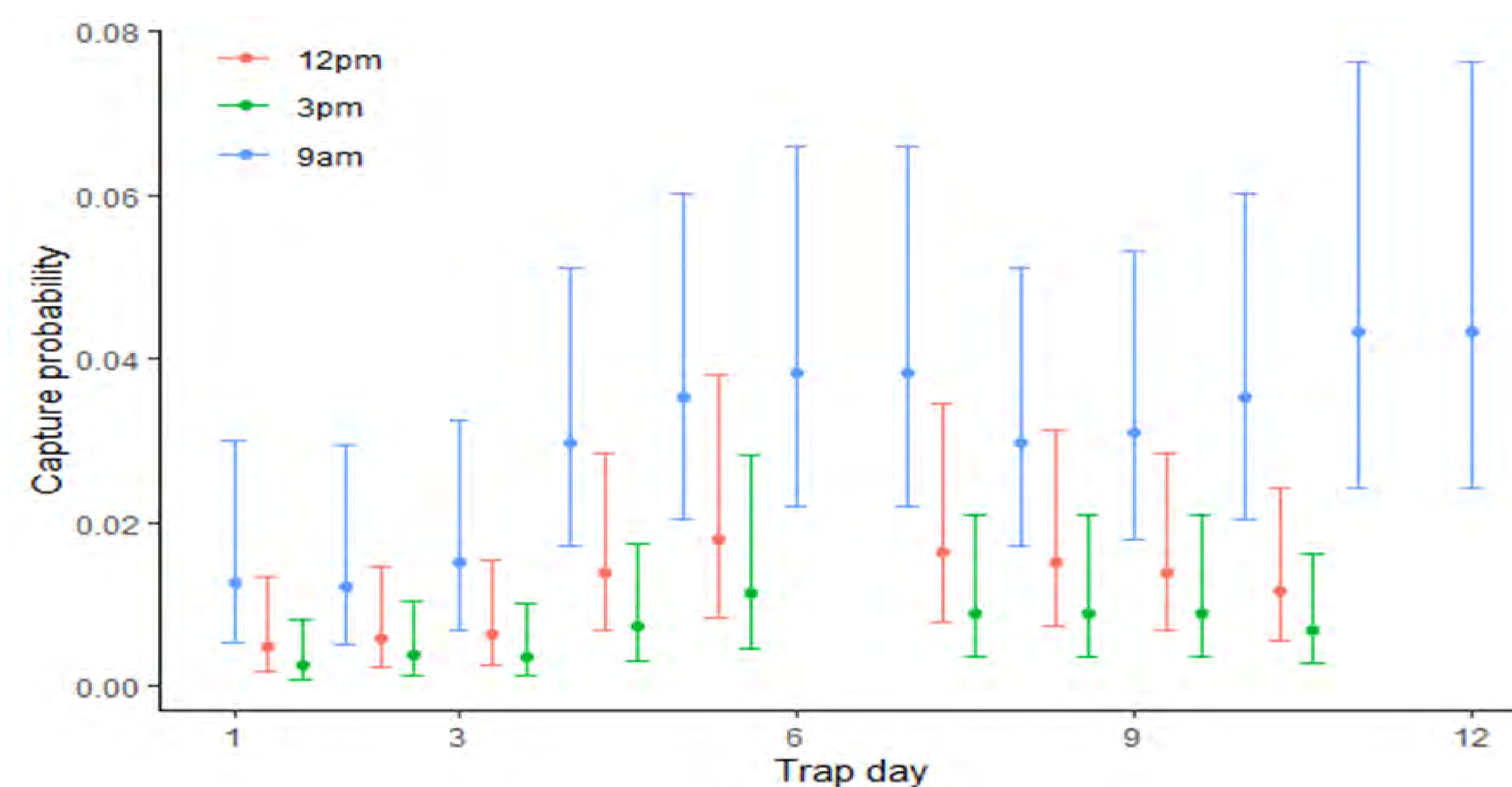

Figure 6. Capture probability figure of time of day estimates at 9am, 12pm, and 3pm at Schmeeckle Reserve, Wisconsin during February-March 2021.

Discussion

- As daily temperature increased the probability of capture for eastern gray squirrels also increased.
  - Ambient temperatures increase in the morning, increasing body temperature of squirrels. This results in heightened squirrel activity (7).
- Why were more squirrels trapped at 9 am?
  - Urban gray squirrels are more active during the day, which is conspecific to the studied diurnal patterns of rural populations (8).
  - Multiple environmental variables such as predation, site activity, and competition contribute to changes in urban squirrel activity (9).
  - Contradicts time data from last year but might be due to lower daily temperatures during trapping last year.
- 2020 data shows population estimate of 55 individuals (20 Berard Oaks, 35 Chilla Woodlot)
  - Similar population estimates when comparing data.
  - Less captures in Berard Oaks due to clear cutting and prescribed burns done on site during data collection.
- Research Gap: Lack of potentially influential weather variables.
  - Additional recording of weather data such as snow depth and wind speed.
  - Focused research on gray squirrel habitat disturbance and its effect on abundance.

Acknowledgements

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