Pine Habitat Characteristics Associated with Variation in Chuck-will's-widow Communities

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Chuck-will's-widows (*Antrostomus carolinensis*)

- Cryptic, nocturnal, migrants and ground-nesting breeders in southeast US
- Nest in open, deciduous, mixed pine and hardwood forests
  - Nests consist of a simple scrape either on bare ground or leaf litter often near woodland edges in dense cover.
- Little else is known about the habitat requirements due to their nocturnal nature.

Study Objectives

- **This study explores the potential impact of variation in forest habitats and management on Chuck-will's-widow density.**

Methods and Materials

- Data collection occurred 26 May to 24 June in 2019
- Sampled eighteen sites representing pine forests under different management
  - Ten sites thinned and controlled burned
  - Five sites thinned
  - Three sites received no management
- Bird vocalization data collected using audio data loggers set for ten-minute intervals an hour after sunset every day
- Recordings analyzed for presence or absence of Chuck-will's-widow and number of singing detections each day
  - Performed detection analysis using the audio software, Kaleidoscope (Figure 1)
- Habitat variables recorded at each site
  - Forest type determined by dominant tree species
  - Age, height, and diameter at breast height (DBH) measured from one tree representative of all trees within each site
  - Percentages of pine basal area, woody, and bare ground estimated at each site
    - Pine basal area - density of pine tree species in each site
    - Woody – woody plant material on forest floor
    - Bare - amount of ground not covered by litter (dead plant material)
  - Midstory-vegetation and snag density rated on a scale of 0 to 5
    - 0=absence of midstory and snags, 5=dense midstory and snags
  - We use a step-wise linear regression approach to build a predictive model of the habitat variables that best predict CWWI vocal detections (JMP v.14.3)
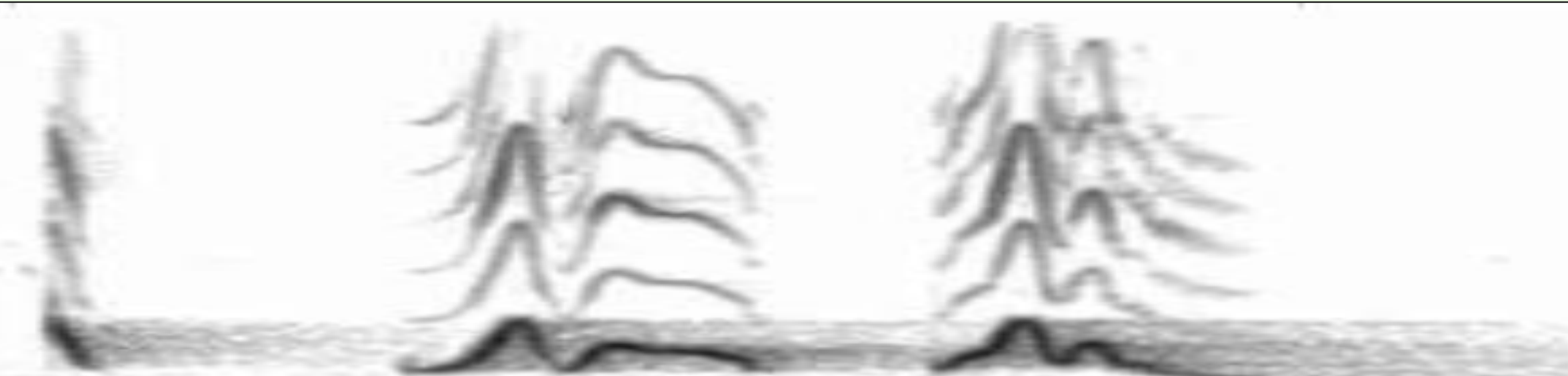

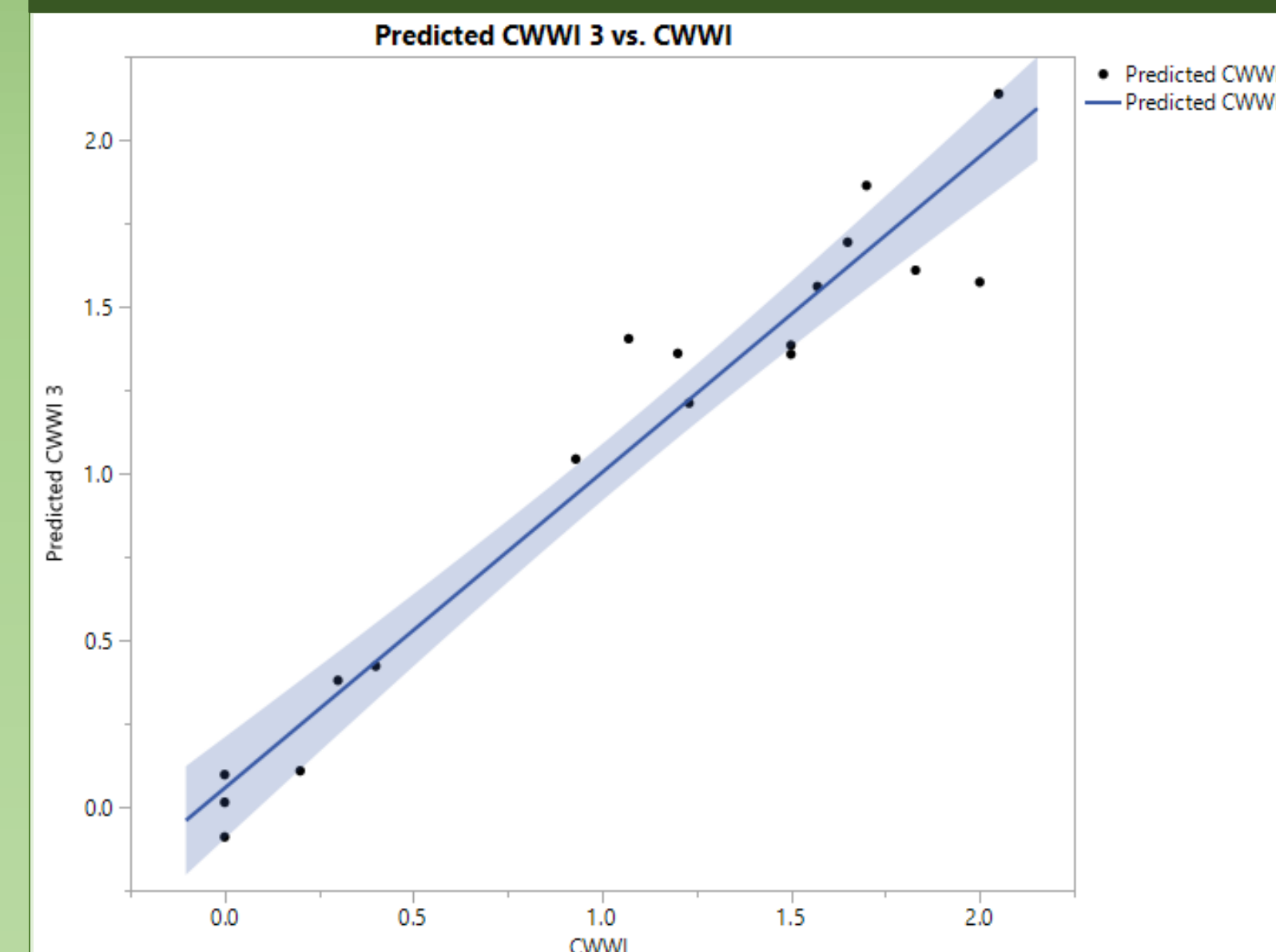**Figure 1.** Chuck-will's-widow song as it appears on a sonagram.

Results

Figure 2. The habitat model developed in this study has significant predictive power. The predicted presence of Chuck-will's-widows closely corresponds with the actual observations of Chuck-will's-widow presence. CWWI = Chuck-will's-widow

Figure 3. Forest age was the habitat variable with the greatest explanatory power for Chuck-will's-widow vocalizations. A negative relation between Chuck-will's-widow presence and forest age is observed.
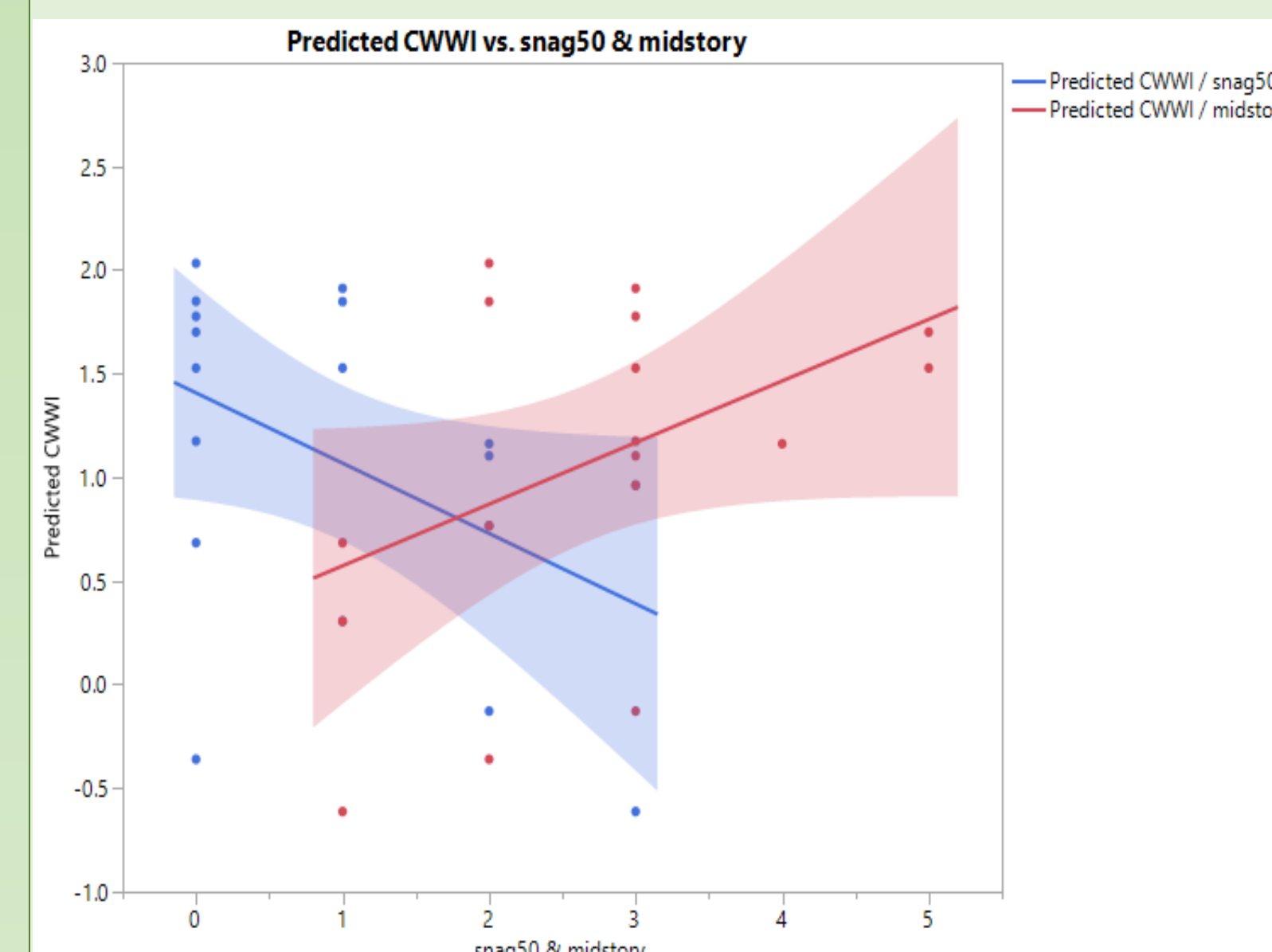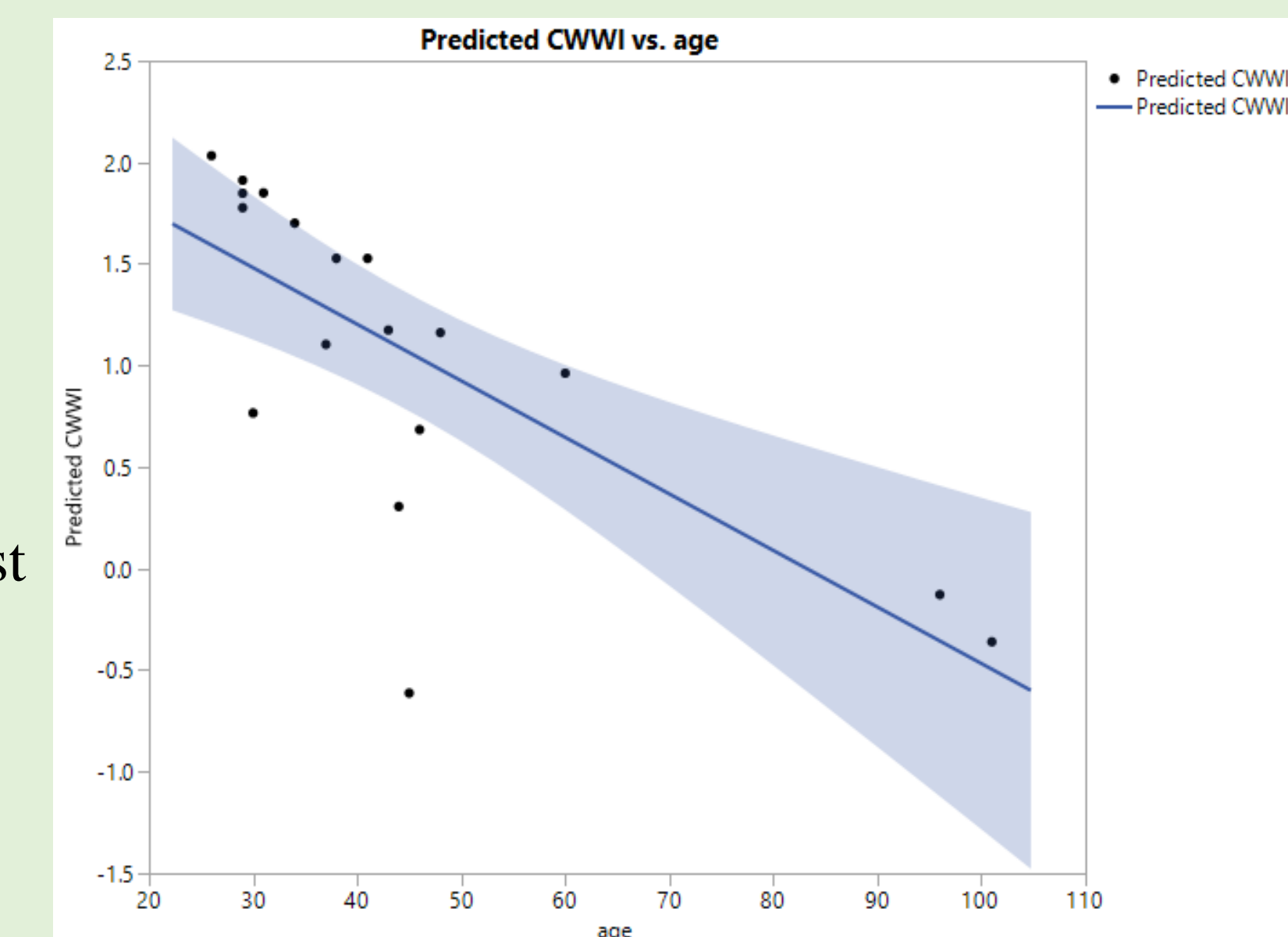

Figure 4. Increasing midstory density is associated with more Chuck-will's-widows and snag density has a negative impact on vocalization.

Figure 5. Other habitat variables showing significant influence on Chuck-will's-widow presence were the amounts of pine basal area, woody vegetation, and bare ground. Pine basal area had a positive relation to Chuck-will's-widow presence, while woody vegetation and bare ground had a negative relation.
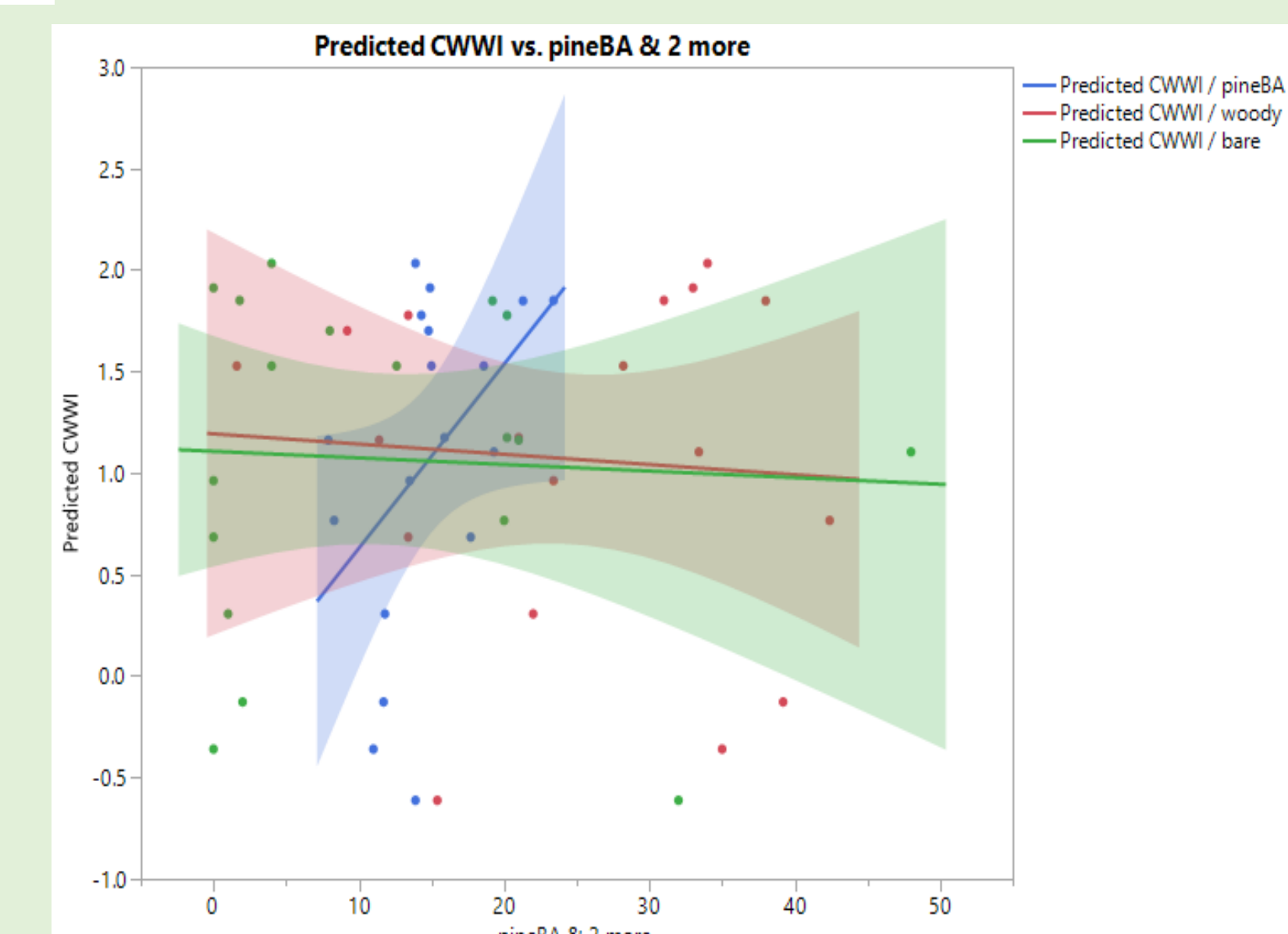
Discussion

- Chuck-will's-widows are detected more often in forests with:
  - Younger stands,
  - More bare ground and woody ground cover
  - Fewer snags,
  - Abundant midstory and larger DBH of pines.
- Forests with little or no forest management had no Chuck-will's-widows.
- Previous studies indicated the importance of forest openness and edges more suitable nesting sites. In contrast, this study found a greater density of Chuck-will's-widows in forests with great midstory density.

Since most nocturnal birds display sporadic calling behaviors, single-year auditory surveys may not be reliable for estimating population size and the results of this study should be considered preliminary. However, if theses results hold, midstory density may be an underappreciated habitat component for this species or habitat selection behaviors differ in east Texas compared to other regions. The reclusiveness of Chuck-will's-widows proves a difficult challenge in determining habitat preferences and requires long-term studies to fully understand the impact of habitat variables and forest management.

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