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ABSTRACT

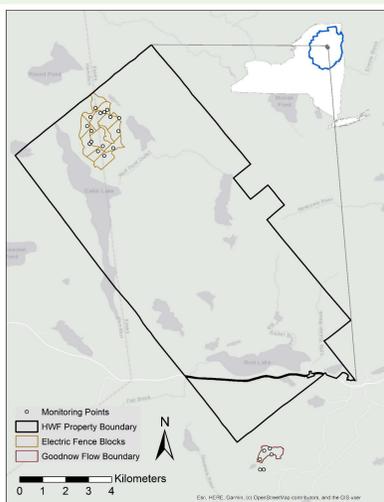
Insectivorous bats play important roles in forest ecosystems and their protection is critical. However, *Myotis* bat populations in North America have declined rapidly and are threatened due to white-nose syndrome (WNS) and habitat degradation. Apart from mitigating WNS, we can also assist the recovery of *Myotis* species by incorporating forest management strategies that improve summer roosting and foraging success. We analyzed bat acoustic activity in the central Adirondack region of New York at an experimental forest management site at SUNY-ESF Huntington Wildlife Forest and at a nearby traditionally managed shelterwood site. To determine the link between bat habitat use and forest structural characteristics, we compared bat acoustic activity and vegetation data at these sites. Our analyses show that forest variables such as canopy cover and sapling density affect probability of bat habitat use. The results of this study can inform forest management decision-making and aid in the conservation of imperiled bat species.

OBJECTIVES

- Determine probability of *Myotis* habitat use at differently-managed shelterwood sites and an unmanaged control site
- Evaluate which forest structural characteristics are most informative in predicting *Myotis* habitat use



STUDY SITES



Location of Electric Fence (EF) site within SUNY-ESF HWF and Goodnow Flow (GF) study site

EF site has 7 blocks with irregular shelterwood cut and 7 uncut control blocks. GF site has commercial shelterwood management.

EF Control



EF Irregular Shelterwood



GF Commercial Shelterwood

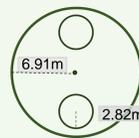


GF site removed understory beech but did not purposely retain large trees

METHODS

VEGETATION SAMPLING

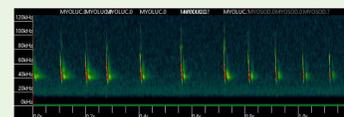
- 5 fixed-radius plots at every detector
- Counted saplings, recorded size class
- Recorded canopy cover at plot center
- Recorded DBH and Tree-Related Microhabitats (TReMs) of trees >10cm (Larrieu et al. 2018, Basile et al. 2020)



ACOUSTIC SAMPLING



- Pettersson D500x ultrasonic detectors
- EF: 16 points; ≥ 14 nights each summer, 2021-2022
- GF: 6 points; ≥ 14 nights, summer 2022
- Analyzed using Kaleidoscope Pro software



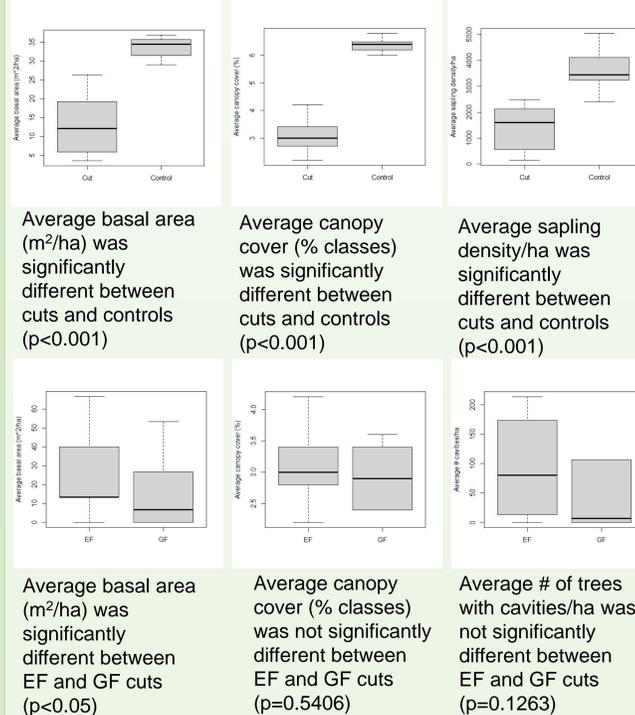
OCCUPANCY MODELING

Detection variables	Occupancy variables
Temperature (°C)	Canopy cover (avg %)
Relative humidity (%)	Sapling density (avg #/ha)
Wind speed (m/s)	Distance from water (m)
Precipitation (cm)	Average basal area (m ² /ha)
Day of year	TReM variables: Average density of snags, cavities, rot holes, and peeling bark (avg #/ha)

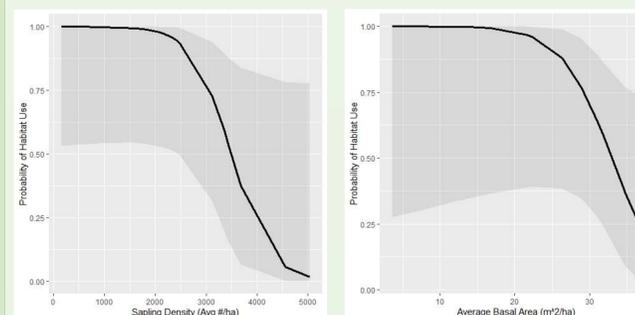
Used occupancy modeling and Akaike's Information Criterion (AIC) to determine the relationships between bat habitat use and forest characteristics. We fit models allowing occupancy (Ψ) and detection probability (p) to vary by detector location (MacKenzie et al. 2017). Ran 6 detection models for single and multi-season models. Ran 9 occupancy models for single-season model and 4 for multi-season model.

RESULTS

VEGETATION

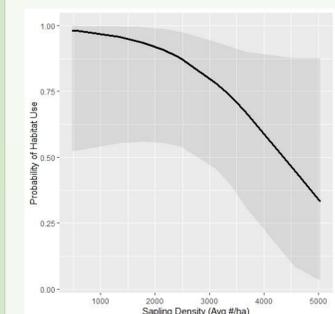


SINGLE-SEASON MODELS



Probability of habitat use in relation to sapling density and basal area. Includes summer 2022 data from EF and GF cuts and control sites.

MULTI-SEASON MODELS



Probability of habitat use in relation to sapling density. Includes summer 2021 and 2022 data from EF cut and control sites.

DISCUSSION

- We found the structure between the EF and GF cuts and the control site to be significantly different. The reduction in canopy cover and removal of sapling layer led to increased probability of *Myotis* habitat use. This is consistent with previous findings in the study region (Gallagher et al. 2021).
- Differences in Tree-Related Microhabitat (TReM) (e.g., cavities, rot holes, peeling bark) densities were not significant between EF and GF sites. The retention of green trees did not significantly increase TReM densities, these variables did not influence *Myotis* habitat use.
- Green-tree retention may be important for providing roost trees on managed landscapes, though it did not affect foraging habitat use.
- Further studies using mist netting and radiotelemetry are needed to see if *Myotis* bats are using the retained trees in the managed landscape.

REFERENCES

Will provide references upon request.

ACKNOWLEDGEMENTS

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