Can the Endangered American Burying Beetle Be Successfully Reintroduced in New York?

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Introduction

Nicrophorus americanus (American Burying Beetle) (ABB) is a federally endangered beetle that has been extirpated from the state of New York (Figure 1). Burying beetles are distinguished by their carcass burying behavior to provide nutrition for their young (Figure 2). The adult size of a burying beetle is dependent on food source availability during its larval stage. ABB prefers large (100-300g) host species such as rats or pigeons for reproduction, while its congeners often use smaller hosts. There are many theories as to why ABB populations have drastically declined including the extinction of the passenger pigeon (Holloway and Schnell 1997) (Figure 3), decrease in top predators, and habitat fragmentation. The U.S. Fish and Wildlife Service (1991) currently has a recovery plan for this species that includes identification of potentially suitable reintroduction sites along the northern periphery of its historic range. The objective of this study was to determine potential reintroduction sites for the American burying beetle in New York by comparing burying beetle community composition and physical condition within specific habitat types.

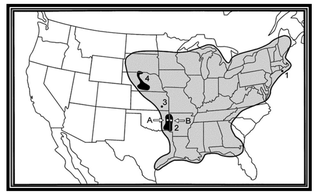

Fig. 1. Historic and current range of ABB

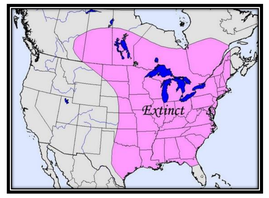

Fig. 3. Historic range of the passenger pigeon

Materials & Methods

- The study was conducted in two different habitat types in Central New York; The Albany Pine Bush Preserve (APBP) which consists of pine barrens and the Charleston State Forest (CSF) which is a mixed northeastern forest habitat (Figure 4)
- Above-ground carrion beetle traps described by Leasure et al. (2012) were baited with carrion (Figure 5) and checked daily each morning throughout the study period
- Collection periods ran from 13 June 2015 through 29 July 2015 in the CSF and from 31 July 2015 through 29 August 2015 in the APBP
- All insects within the traps were identified and enumerated. *Nicrophorus* beetles were taken to the lab, measured, marked and released the following day at a designated release site.
- Burying beetle pronotum width was measured using procedures described by the U.S. Fish and Wildlife Service
- Trap night frequency and average pronotum width of all *Nicrophorus* spp. were compared between the two sites using a two-tailed ANOVA test

Fig. 4. Ground photos of the study sites

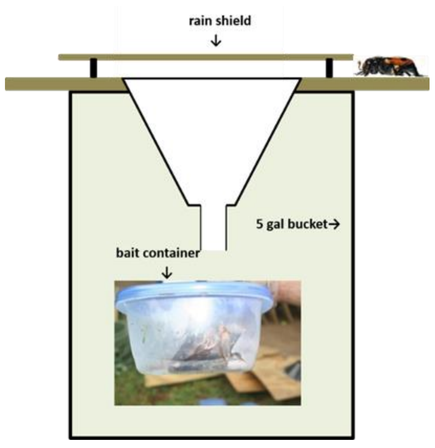

Fig. 5. Above-ground pitfall trap

Results

Five *Nicrophorus* beetle species were captured at these sites including *N. orbicollis, N. tomentosus, N. sayi, N. pustulatus, and N. vespilloides* (Table 1). Over 24 trap nights at CSF, trap night frequencies were: *N. orbicollis*, 0.48 (n = 281), *N. pustulatus*, 0.04 (n = 27), *N. tomentosus*, 0.47 (n = 299), *N. sayi*, 0.06 (n = 42), and *N. vespilloides*, 0.01 (n = 8). Over 29 trap nights at APBP, trap night frequencies were: *N. orbicollis*, 2.00 (n = 383), *N. tomentosus*, 2.95 (n = 717), and *N. sayi*, 0.009 (n = 3). (Figure 6). Average pronotum widths of beetles collected at CSF were: *N. orbicollis*, 6.4mm (±0.82), *N. pustulatus*, 6.1mm (±0.49), *N. tomentosus*, 5.1mm (±0.58), *N. sayi*, 5.6mm (±0.77), and *N. vespilloides*, 4.6mm (±0.75) (Figure 7). Average pronotum widths of beetles collected at APBP were: *N. orbicollis*, 6.7mm (±0.89), *N. tomentosus*, 5.2mm (±0.59), and *N. sayi*, 5.8mm (±0.76).

Table 1. Species and number of individuals captured at the two study sites during the trapping periods

Location	Species	No Individuals
Charleston State Forest	*N. orbicollis*	281
	N. pustulatus	27
	N. tomentosus	299
	N. sayi	42
	N. vespilloides	8
Albany Pine Bush Preserve	*N. orbicollis*	287
	N. tomentosus	637
	N. sayi	3

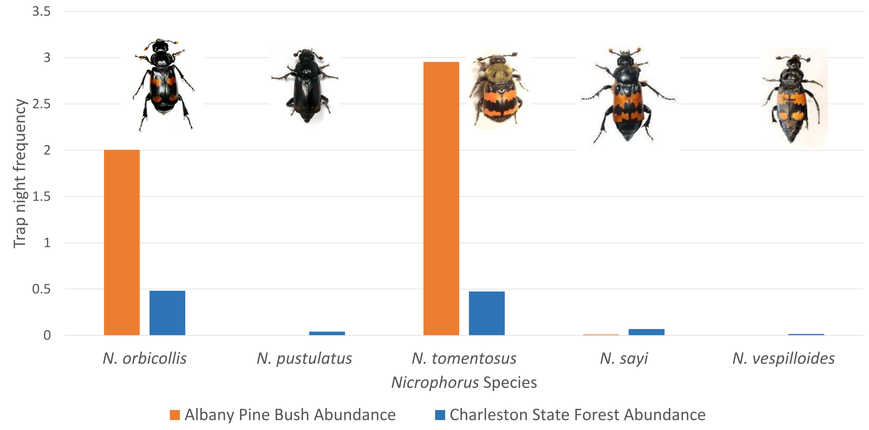

Fig. 6. Trap night frequencies of beetle species captured throughout study at The Albany Pine Bush Preserve and the Charleston State Forest

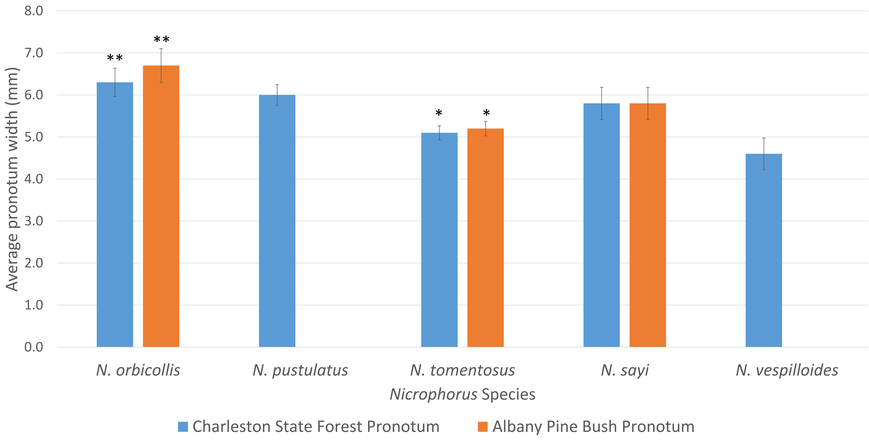

Fig. 7 Mean pronotum width of *N. tomentosus* at Charleston (n= 113) and at Albany Pine Bush (n=928) and *N. orbicollis* at Charleston (n=67) and at Albany Pine Bush (n=433) in July-August 2015 *(p=.006 at α of .05) **(p=.003 at α of .05)

Discussion

- Trap night frequencies of all *Nicrphorus* spp. collected between sites were not significantly different.
- The two most common species at both sites were the ABB "surrogate" *N. orbicollis* and the *N. tomentosus*.
- Having high capture rates of *N. orbicollis* in both forest types suggests that the CSF and APBP could both be suitable habitat for the ABB. The presence of *N. pustulatus* at CSF could prove troublesome as this creates a potential for brood parasitism of ABB.
- The overall condition of the beetles was similar between the APBP and CSF, suggesting similar host availability between the sites.
- The remaining pine barrens in the northeast are reduced and fragmented while the mixed forest habitat represents a much larger contiguous area therefore mixed forest habitat may be a more suitable choice for the reintroduction effort.

Fig. 2. Male and female ABB preparing a carcass for rearing young (left) and ABB larvae crawling on a quail carcass (right). *Photo Credit: Lou Perrotti/Roger Williams Park Zoo*

Acknowledgments

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