IMPACT OF DEER BAIT SITES ON *PEROMYSCUS* MICE IN SOUTHERN ILLINOIS

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ABSTRACT

Introduction

Wildlife populations are heavily influenced by food availability and predation rates. Changing the distribution of high quality food sources can often alter the distribution of wildlife populations. In particular, increases in food abundance can result in immigration; earlier breeding; and increased productivity, survival, and density of wildlife (Morris et al. 2011). Increases in prey abundance, however, may also lead to increases in predator densities, which can in turn decrease survival and increase emigration (Cooper and Ginnett 2000, Hamilton et al. 2002). Furthermore, predation risk can cause sublethal changes in prey behavior such as different habitat use, increased vigilance, decreases in home range size, and decreased reproductive output (Lima and Dill 1990).

Establishing bait sites for studying and hunting game species is a common practice, but nontarget species such as deer mice (*Peromyscus maniculatus*) may also be attracted to and consume this supplemental food (Rollins 1996). As granivores, *Peromyscus* species provide important ecological services such as distributing seeds and serving as prey for a wide variety of predators. These mice have short generation spans that allow them to respond quickly to changes in their environment. Because bait tends to be more ephemeral (days) than naturally occurring concentrated food sources, such as fruiting trees (months), monitoring small mammal communities may show how quickly they can respond to changes in food abundance. Knowledge on how *Peromyscus* mice respond to these changes may help predict how other similar and endangered species may respond in these situations. Furthermore, a new spatial arrangement of prey may trigger other species to respond, causing additional changes in population parameters. Our objective was to characterize the potential impacts of short-term bait sites on *Peromyscus* population parameters.

Methods

Touch of Nature Environmental Center (Makanda, IL) contains more than 1,200 ha in the southern part of the state. We conducted a paired-grid study at this location on a 50-ha forested site dominated by oaks (*Quercus* spp.) and hickories (*Carya* spp.). Two plots were established about 700 m apart so that mouse home ranges would not overlap but forest composition would be similar between the plots. We monitored for white-tailed deer (*Odocoileus virginianus*) to make sure they were present on each plot. We placed Sherman traps (H.B. Sherman Traps, Inc., Tallahassee, FL) 10 m apart on an 8 by 8 grid in each plot. Traps were baited with bird feed, and we trapped for 3 nights

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each week for 9 consecutive weeks in August-October 2012. We applied a uniquely numbered tag (5 mm high by 11 mm long; National Band and Tag Co., Newport, KY) to each captured *Peromyscus* mouse and recorded age, sex, and capture location.

During weeks 4-5, we maintained 2.3 kg of corn at the center of the grid in one plot, similar to what would be used for research or by hunters. We monitored for deer use of the bait pile. We used weekly mark-recapture data of *Peromyscus* mice to run Huggins robust-design models in the RMark package in program R. We created a priori models to determine effects of bait, session, time, age class, and sex. We ranked models by using the second-order Akaike information criterion (AIC_c) and considered any model within 2 ΔAIC_c to be competing.

Results And Discussion

Our top model included age class and an interaction between time and session in both capture and recapture parameters. Capture probabilities ranged from 0.30 to 0.57 during the prebait session, 0.54 to 0.63 during the bait session, and 0.37 to 0.90 during the postbait session. Recapture probabilities were 0.50-0.66 during the prebait session, 0.56 in the bait session, and 0.10-0.45 during the postbait session.

We found that age and an interaction between time and session were important factors influencing capture and recapture rates. Capture rates increased with time, and recapture rates decreased with time. These results are most likely indicative of a population with low immigration rates: as time progressed, the number of unmarked individuals decreased and the number of marked individuals increased within the relatively stable population. Adults had higher capture and recapture rates than juveniles, but sex had no effect in any of our top models. This age bias may be associated with drought conditions during summer 2012 that may have reduced survival and reproductive rates and therefore decreased the number of young within the population during our study (Yahner 1992). We found that the bait pile did not influence *Peromyscus* survival, emigration, or immigration. Mast availability in the study area may have buffered the effects of concentrated food on *Peromyscus* populations. The short timeframe of 2 weeks of baiting may have also buffered the population from predators who may be unable to pinpoint this potential food concentration at such a timescale (Boutin 1990).

Conclusions

Our study provides preliminary support that short-term baiting does not affect *Peromyscus* mice population parameters in southern Illinois. Future studies should be conducted in different habitats and seasons to better understand responses of populations in those areas. Altering the durations of concentrated food sources may cause changes in population parameters if *Peromyscus* or predators have more time to key in on these food concentrations and prey locations.

Literature Cited

Boutin, S. 1990. **Food supplementation experiments with terrestrial vertebrates: patterns, problems, and the future.** Canadian Journal of Zoology. 68: 203-220.

Cooper, S.M.; Ginnett, T.F. 2000. **Potential effects of supplemental feeding of deer on nest predation.** Wildlife Society Bulletin. 28(3): 660-666.

Hamilton, A.M.; Freedman, A.H.; Franz, R. 2002. **Effects of deer feeders, habitat and sensory cues on predation rates on artificial turtle nests.** The American Midland Naturalist. 147: 123-134.

Lima, S.L.; Dill, L.M. 1990. **Behavioral decisions made under the risk of predation: a review and prospectus.** Canadian Journal of Zoology. 68: 619-640.

Morris, G.; Hostetler, J.A.; Oli, M.K.; Conner, L.M. 2011. **Effects of predation, fire, and supplemental feeding on populations of two species of *Peromyscus* mice.** Journal of Mammalogy. 92: 934-944.

Rollins, D. 1996. **Evaluating a deer feeding program: biological and logistical concerns.** In: Ramsey, C.W., ed. Supplemental feeding for deer: beyond dogma. Kerrville, TX: Texas A&M University System: 67-73.

Yahner, R.H. 1992. **Dynamics of a small mammal community in a fragmented forest.** The American Midland Naturalist. 127(2): 381-391.