

Small-Mammal Response to Moonlight in Restored Tallgrass Prairie

Introduction

Small mammals play an important role in prairies by eating and dispersing seeds of native plants (Howe & Brown 2000). Most small mammals are nocturnal, and moonlight can suppress small-mammal activity by increasing predation risk (Upham & Hafner 2013), but this has not previously been investigated in prairies. Bison alter the prairie landscape by grazing and



Figure 1: Photo of juvenile *Peromyscus* spp. from trapping session at Nachusa Grasslands.

wallowing. This can affect small mammal behavior since low vegetation is less dense, making moonlight more influential (Guiden & Orrock 2019). Moonlight influenced activity suppression can vary by species (Prugh & Golden 2013).

We hypothesized that moonlight would suppress nocturnal activity of three common small-mammal species: *Peromyscus maniculatus* (deer mouse), *Peromyscus leucopus* (white-footed mouse), and *Microtus ochrogaster* (prairie vole).

Methods

This study was conducted at Nachusa Grasslands, a restored tallgrass prairie in Franklin Grove, IL. This is a part of a long-term small-mammal monitoring program conducted at within Nachusa. In 2014, Bison were reintroduced to 7 of the 17 study sites. We quantified small mammal activity using live trapping. At each site, we trapped small mammals for four consecutive nights four times per year (spring, early and late summer, and fall) between 2013 and 2019. For each night of trapping at a site, we determined if a small-mammal species was present (1) or absent (0). In order to understand how moonlight affects small mammal activity,

we used a lunar calendar to quantify moon phase during each night of trapping. Moon phase was recorded as the percent of moon visible (no moon = 0, full moon =100). We also compared the age of the sites and whether a site had been burned recently, but these factors were not as significant as bison presence.

Results

Moonlight impact on nighttime activity varied by species. On nights with bright moonlight, *P. maniculatus* was less active in bison sites but more active in non-bison sites. *P.*

leucopus was more active during

bright moons in bison sites, but

equally active at all moon phases in

non-bison sites. *Microtus*

ochrogaster was only slightly more

active during bright moons in bison

sites and equally active at all moon

phases in non-bison sites.

Discussion

Bison and moonlight interactively shaped small mammal activity. Differing responses to moon patterns suggests that moonlight might affect competition between small mammal species for resources such as seeds. Bison grazing may

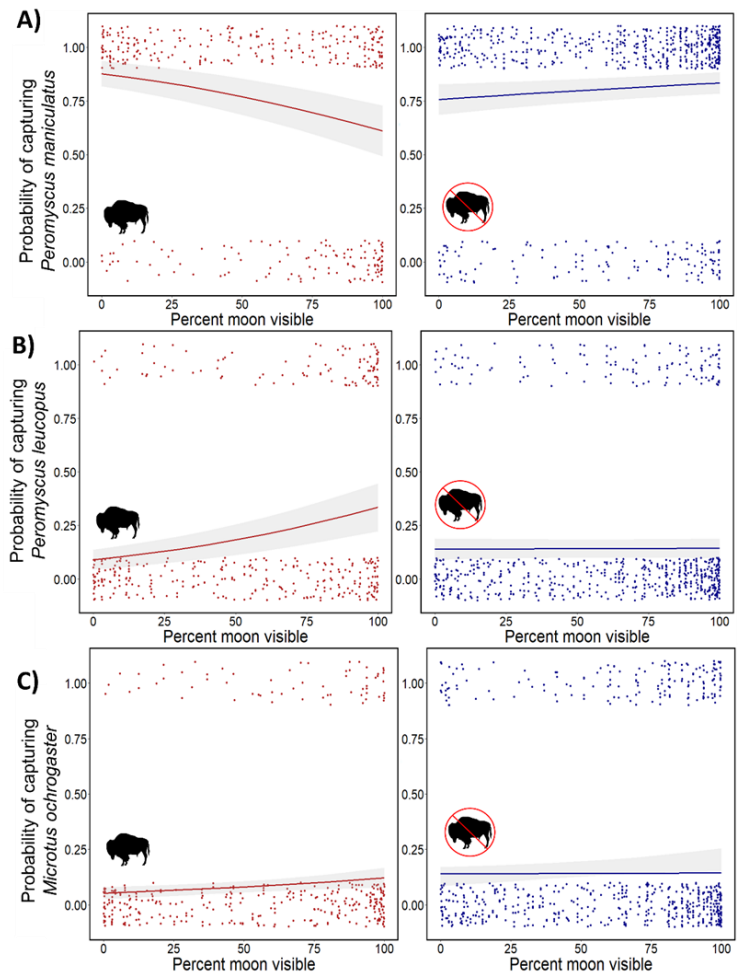


Figure 2: Small-mammal activity as a function of moonlight in sites with bison (red) and without bison (blue). A) *Peromyscus maniculatus*, B) *Peromyscus leucopus*, C) *Microtus ochrogaster*.

increase predation risk for *P. maniculatus*, since small mammals are more visible to predators in areas with little vegetation. Predation risk is potentially less important to *P. leucopus* than competition with *P. maniculatus*.

In future experiments, we would like to collect finer-scale data about when small mammals were active and study other species to see if they follow similar patterns. The lunar cycle seems to matter in prairies, but not all species respond the same way.

Works Cited

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