

Impacts of Habitat Fragmentation on Eastern Grey Squirrel Foraging Ranges

-Jack Wilde, Rubenstein School of Environment and Natural Resources, University of Vermont-

Background:

- Despite the significant ecological role Eastern Grey Squirrels occupy in forested ecosystems and their relatively prolific numbers in NA and Europe, research regarding their movement ecology remains underexplored; specifically, the influence of ecological and anthropogenic factors in the population processes of said species (Perlut, 2020).
- Multiple factors, from traditional assessments of relative habitat size and species density (Fitzgibbon, 1993) to alternative landscape characteristics observed as a result of urbanization (Parker & Nilon, 2012) influence the behavioral patterns and strategies employed by individuals in the natural world.

Figure 1. Visual indicator of Eastern Grey Squirrel distribution in Northern America, showcasing the influence of the species (image retrieved from Animalia.bio page on the Eastern Grey Squirrel).



Motivation:

- Increased habitat fragmentation and suburban development are processes representative of the impact anthropogenic activity exerts upon species within range of said disturbances (McGregor, Bender & Fahrig, 2008).
- I propose to survey differences in observed foraging ranges and time allocation regarding such activities between Eastern Grey Squirrels situated in environments subject to varying degrees of fragmentation & anthropogenic involvement.

Hypothesis:

- I hypothesize that there is a correlation between anthropogenic habitat fragmentation and Eastern Grey Squirrel foraging ranges and exhibited behavior.

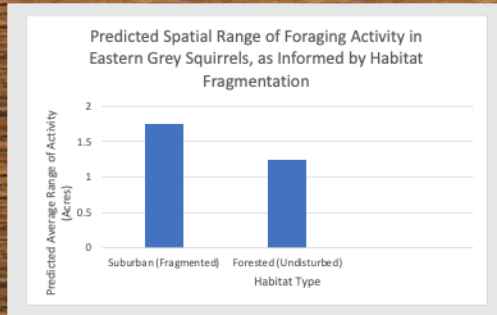


Figure 2. Predictions pertaining to ranges of foraging activity as dependent on relative habitat fragmentation and human intervention, measured in acres. Initial values for undisturbed sites draws on research done by John Doebel & Burd McGinnes, which reported an average minimum home range of 1.20 acres.

Predictions:

- I predict that as habitat fragmentation intensifies and Eastern Grey Squirrels are increasingly restricted by anthropogenic activities, their relative range of foraging & time allocated for resource gathering will increase as a result of reduced competition from species occupying similar niches.

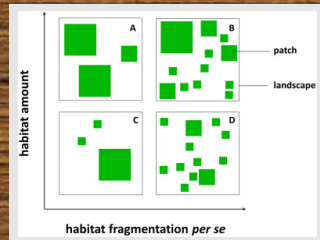


Figure 3. Visualization of fragmentation as opposed to habitat loss (the distinction is important, as, contrary to expectations, fragmentation does not always limit the amount of habitat present in an area)(image courtesy of Biological Conservation vol. 230)(see literature citations).

Experimental Design:

- Our research entails an observational study at the South Mountain Reservation of Essex County, NJ, alongside the adjacent township of Maplewood.
- This experimental design represents an application of the “mark-recapture study,” as our primary interaction with the aforementioned species comes through fitting & removing applied radio-collars, which inform us of the movement & vitality of collared individuals. The technology inherent to this method of observation has been proven to work in squirrel populations before (Beal, 1967).
- The initial observation period is 1 week with the initial group (15 individuals minimum), followed by 1 week with the re-capture group. Our experiment is liable to be repeated yearly, as an annual assessment of foraging behavior during the Fall (insofar as Fall is the time of year in which squirrel populations are most actively foraging).



Figure 4. Map of indicated site denoting habitats with reduced fragmentation (South Mountain Reservation). Relative proximity to suburban environment provides a perfect contrast for observing the implications of anthropogenic involvement in these two distinct habitats (image retrieved from NY & NJ trail conference website: nynjtc.org).



Figure 5. Example of radio-collaring as applied to squirrel populations. The technology for such research has existed since the 1960's (image retrieved from The National Center for Biotechnology Information).

Intended Analysis:

- Our response variable of foraging behavior is quantitative (time represented in numerical form, relative activity represented through distance travelled), whereas the explanatory variable of habitat fragmentation is categorical (suburban, forested). As such, the best option for data analysis is found in the T-test inferential statistic.
- Through this, we will determine whether or not to give credence to our null hypothesis of there being no relationship between Grey Squirrel foraging behavior and habitat fragmentation.
- As we have applied conditions ensuring randomization and replication, our findings may be applied to greater Eastern Grey Squirrel populations as opposed to our initial study area(s).

Management Implications:

- Through garnering a greater understanding of the impacts anthropogenic developments have on the movement behavior of the Eastern Grey Squirrel, a species known for seed dispersal, we may better inform human processes and development in reference to the continued functioning of forest ecosystems,