

Habitat Fragmentation Affects Plant Cover but Doesn't Affect Species Richness

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Introduction:

- Plant biodiversity is the foundation for a productive and healthy ecosystem.¹
- Habitat fragmentation, defined as the process during which large areas of habitat are converted into small, isolated patches of habitat, can lead to quick substantial decreases in plant biodiversity.^{2 3}
- Edge-effects have multiple impacts on habitat including higher plant mortality and reduced wildlife density.⁴
- I wanted to know how habitat fragmentation affected the edges of the PSU Scranton wood-lot.

Questions:

- How did the edge-effect influence the interior of the lot?
- What is the edge's effect on a.) the number of species of plants, b.) the number of individual plants c.) and are the edges of the plot denser than the inside of the plot?

Methods:

- I surveyed the PSU Scranton wood-lot using a measuring reel (Fig 1).
- I placed 5 flags along each of the four lines, equally spaced.
- At each flag I measured plots that are 1x1M.
- In each plot, I photographed both the ground and canopy.
- I used ImageJ to calculate the ground flora density, and the canopy density of the plots by thresholding color to identify “green,” measuring the area of the plots, and making the image binary to aid in visual flora contrast (Fig 2).
- I identified and counted the number of species and plants per plot.



Fig 1
Map of PSU Scranton wood-lot with plot lines

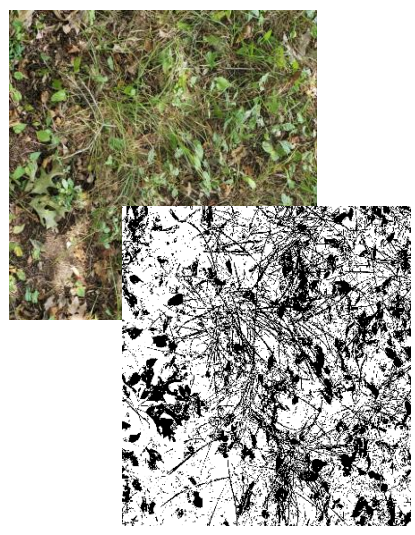


Fig 2
Ground Flora image before and after thresholding

Results:

There was significantly less ground cover in internal plots than those on the edge (Fig 3; $t = -3.26$, d.f. = 15, p -value = 0.00)

There was no significant difference between internal and edge sky expanse (Fig 4; $t = -0.84$, d.f. = 15, p -value = 0.41)

There was no significant difference between internal and edge number of species (Fig 5; $t = -0.62$, d.f. = 15, p -value = 0.54)

There was no significant difference between internal and edge total number of individual plants (Fig 6; $t = -1.62$, d.f. = 15, p -value = 0.13)

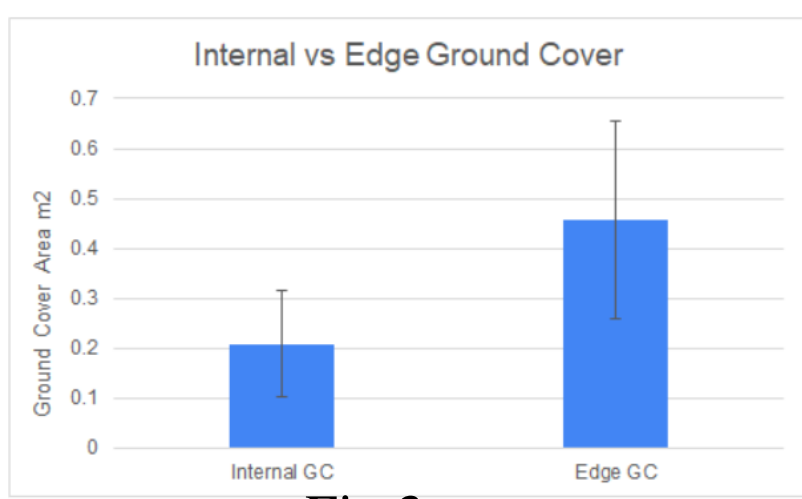


Fig 3

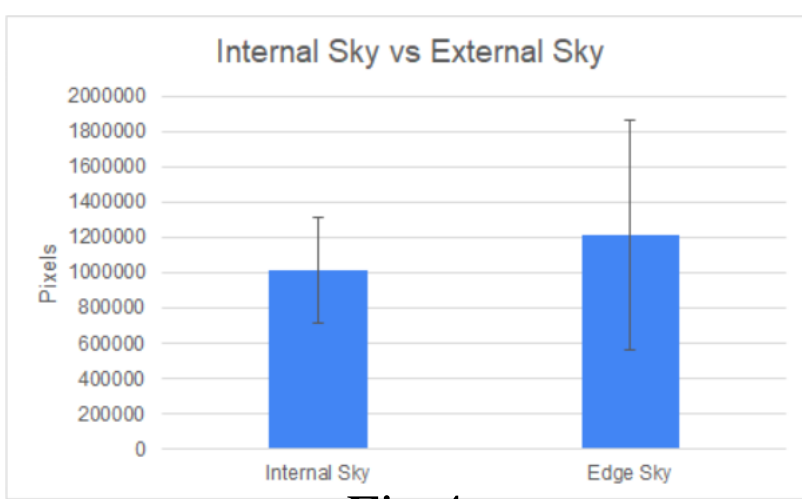


Fig 4

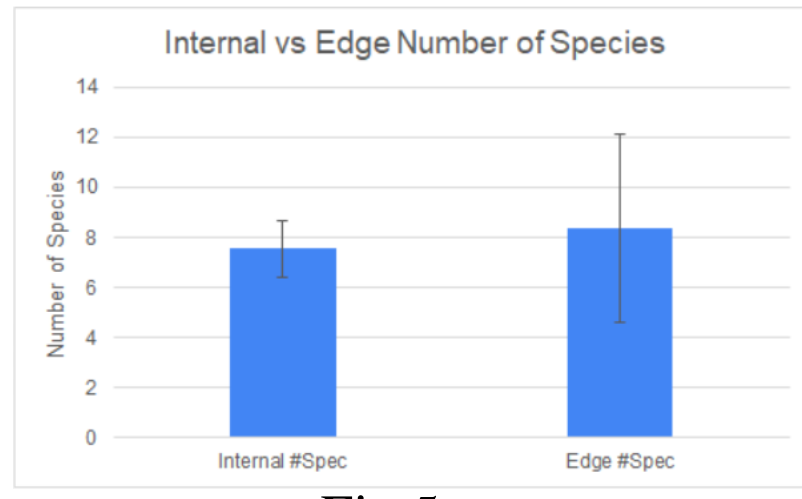


Fig 5

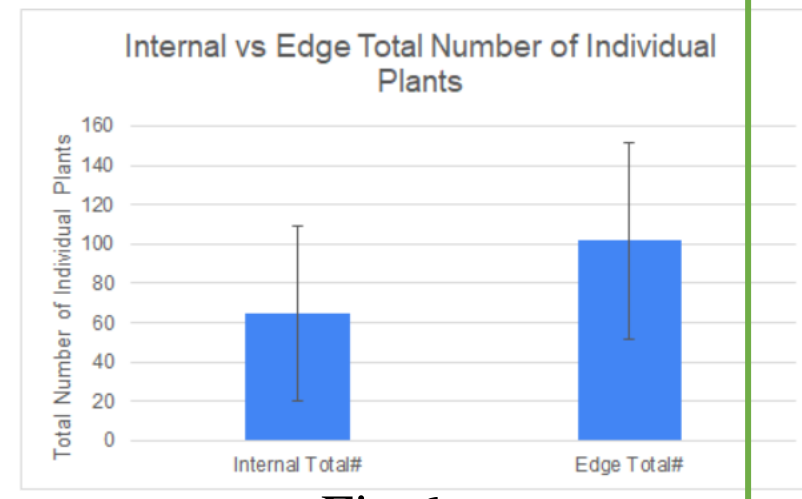


Fig 6

Discussion:

- Habitat fragmentation has a greater effect on plant ground cover on the edge of the lot than within the lot, but it does not affect species richness.
- Plots on the edge of the lot have more ground cover compared to plots within the lot.
- Edge-effect resulted in significantly less ground coverage on the interior of the lot.
- The edge has no effect on the number of species of plants, nor the total number of individual plants, nor the diversity of the species, but plots on the edge of the lot are denser than plots within the lot, exemplifying the possible effects of habitat fragmentation on a small lot of land (different because other studies focused on large lots of land, eg. rainforests).
- Future studies will consist of conducting identical experiments on similar sized lots of land to see if these findings are consistent with the effects of habitat fragmentation and edge-effects documented at the PSU Scranton wood-lot.



References:

³Aguilar, R. et al (2008). Genetic consequences of habitat fragmentation in plant populations: Susceptible signals in plant traits and methodological approaches. *Molecular Ecology*, 17(24), 5177-5188.

¹Corlett, R. (2016). Plant diversity in a changing world: Status, trends, and conservation needs. *Plant Diversity*, 38(1), 10-16.

²Datry, T. et al. (2017). *Habitat Fragmentation and Metapopulation, Metacommunity, and Metaecosystem Dynamics in Intermittent Rivers and Ephemeral Streams*. Academic Press, 4.9, 377-403.

⁴Porensky, L. Young, T (2013). Edge-effect interactions in fragmented and patchy landscapes. *Conservation Biology*, 27(3), 509-519.

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