**Introduction**

- Two possible mechanisms of community assembly are niche-based assembly (in which a species' traits determine its ability to establish and persist in a locality) and drift-driven assembly (influenced solely by random processes).

- Beta diversity (the variation among communities in composition) can be used to predict which type of assembly has shaped a given community.

- The composition of communities shaped by niche-based assembly is expected to be more predictable than the composition of randomly assembled communities in otherwise similar environments (Chase 2007).

- In this study we chose to use lichen communities in the Boundary Waters Canoe Area Wilderness in northern MN to test Chase's findings regarding community assembly processes.

**Hypothesis:** Fire acts as an environmental filter, leading to niche assembled communities with low beta diversity, compared to drift-driven communities unexposed to fire, which would exhibit high beta diversity.

**Methods**

- 10 sample sites, 5 inside the 2006 Cavity Lake Fire area, 5 outside.

- 4 plots per site, 10m from shore, and 10m from each other.

- 3 transects per plot, each 3m long and 1m wide, lichen quantified along these belts.

- Also measured: canopy cover, dominant vegetation, soil compaction, substrate, and distance to nearest living tree.

**Results**

![Figure 1: Principal coordinates analysis (PCoA) simultaneously showing the relationships between each of the communities based on a matrix of their similarities (calculated using Jaccard's index of community similarity).](image)

- The closer the communities are to the centroid, the more similar they are to each other.

- Burned communities are more closely grouped (mean distance to centroid = 0.26) than unburned communities (mean distance to centroid = 0.47).

- ANOVA (p <<0.01) and permutation (p << 0.01) tests confirm that these distances are significantly different from each other.

- Essentially, burned communities have significantly lower beta diversity than unburned communities.

**Figure 1:**

**Figure 2:**

- The relative proportions of the top ten most often observed lichen species in burned and unburned sites.

- Burned communities are dominated by two prevalent species.

- Unburned communities feature a more diverse and even composition of species.

**Conclusions**

**Figure 1:**

- The lower beta diversity seen in burned communities suggests that deterministic niche-based assembly processes are at work due to the environmental filter provided by fire.

- Conversely, community assembly in unburned areas is driven by drift due to the lack of a harsh environmental filter.

**Figure 2:**

- The dominant species (*Cladonia fimbriata* and *Peltigera aphthosa*) in the burned communities are known to be susceptible to fire, thus they must have established post-disturbance.

- This indicates that they possess the requisite traits to establish in the burned environment, suggestive of deterministic assembly.

**Acknowledgments**

We would like to thank Collaborators Matt Haak and Matt Moir, Williams and Hall Outfitters, the National Forest Service, UWEC Office of Research and Sponsored Programs, UWEC differential tuition, and Mother Nature.

**Literature Cited:**