Linking Prairie Ant Communities & Fire:
Ant Diversity in Burned and Unburned Prairie Remnants of Western MN

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Introduction

- The tallgrass prairie is one of the most threatened and highly fragmented ecosystems in the world.
- Fire promotes diversity and productivity in prairies by maintaining the dominance of grasses over woody plants and is a crucial component of prairie management (Hibbs & Huenneke 1992).
- Ants historically have been used as an indicator group of biodiversity and ecosystem function across a variety of habitat types (Alonso 2000).
- The perennial *Echinacea angustifolia* is a model for studying habitat fragmentation in the tallgrass prairie. *Echinacea* supports ants by hosting sap-feeding herbivores, such as aphids. Aphid honeydew provides high-energy food for ants.
- I compared ant communities in burned and unburned units of the 96 acre Staffanson prairie preserve in West-Central Minnesota. Within each burn unit (SPPE, SPPW), I compared areas with and without dense patches of *E. angustifolia*.
- I also evaluated the ability of the experimental design to capture ant biodiversity.

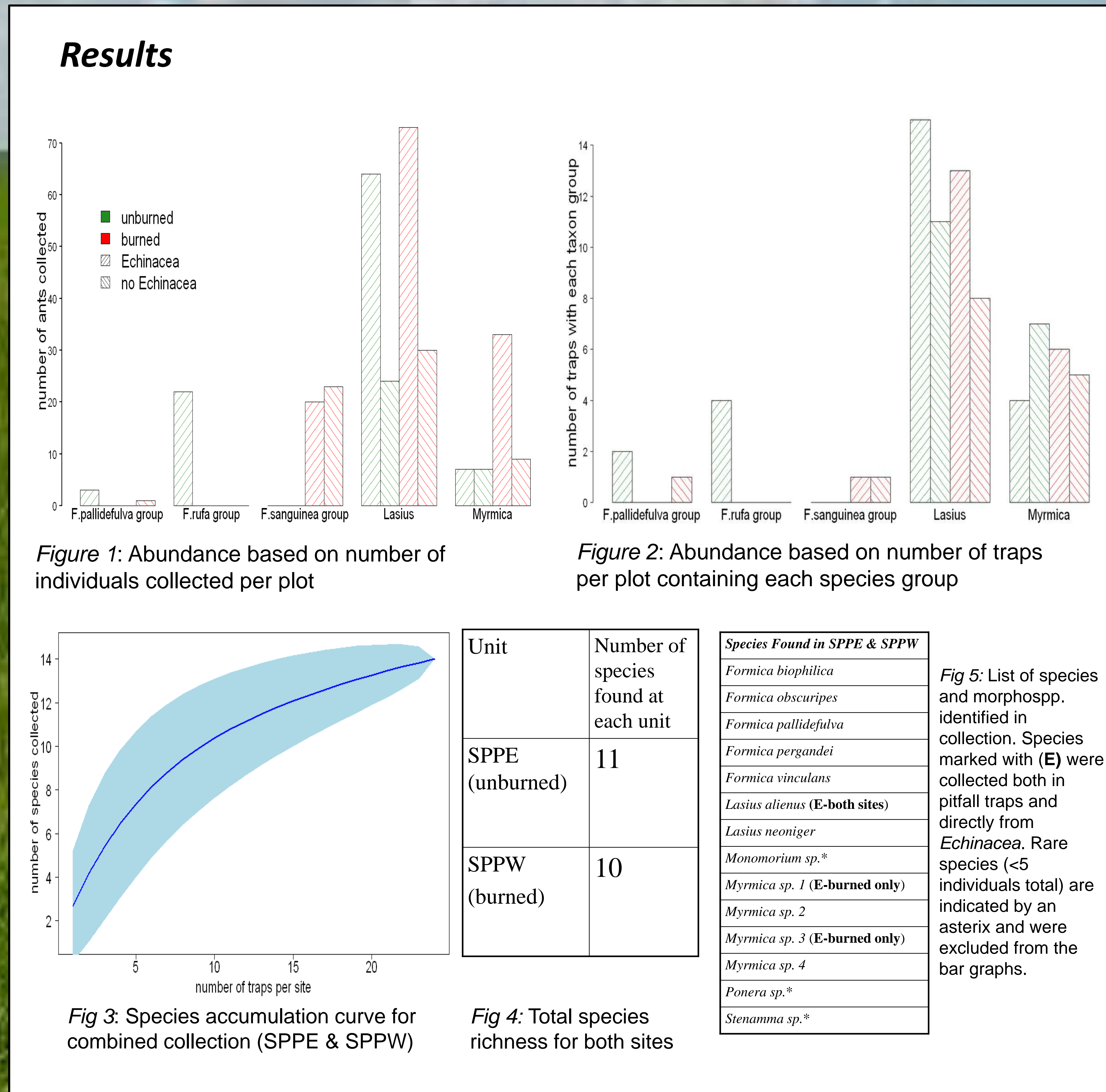## Materials and Methods

Collection & Identification:

- Pitfall traps: 12 traps in each plot, 2 plots per burn unit (one placed within *E. angustifolia* patches, the other in areas without it)
- Traps 5m apart, plots minimum of 20m apart
- Ants collected from pitfall traps 19 July, 2012
- Ants collected by hand from aphid-infested *E. angustifolia* (7 July and 25 July)
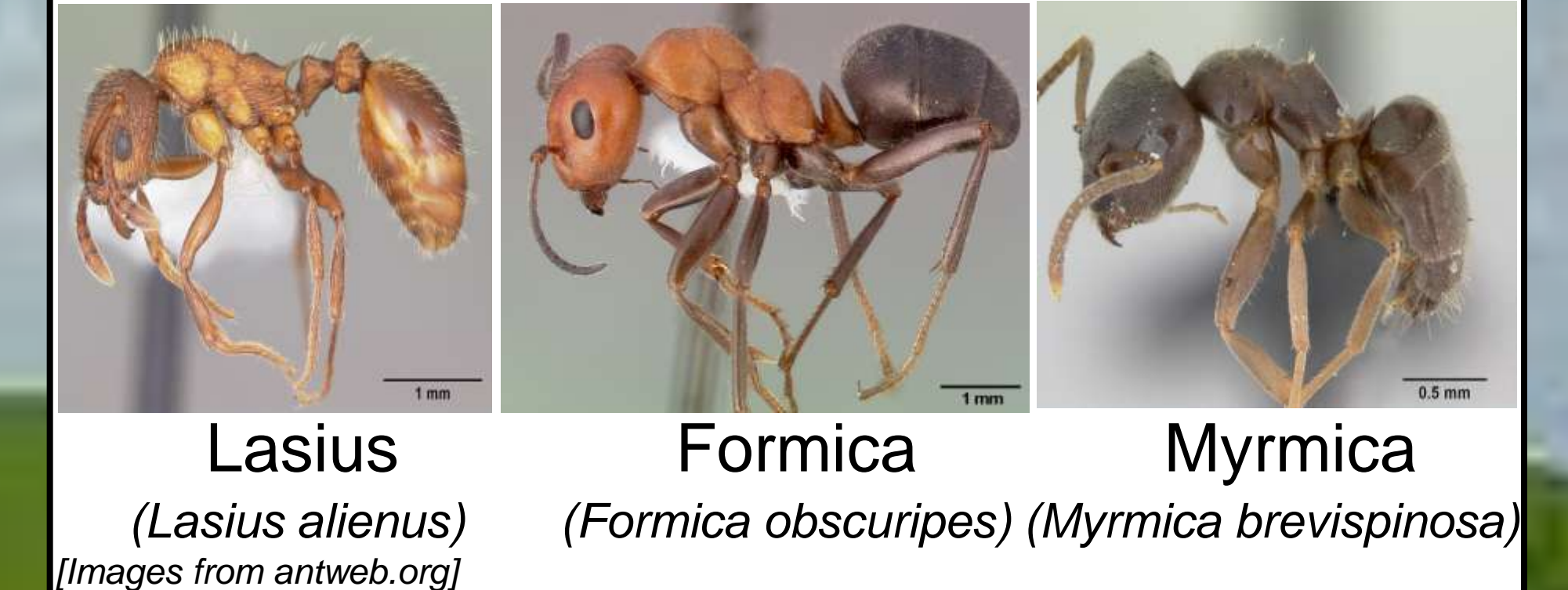- Identified to genus, subgenus, and morphospecies.

Data Analysis:

- Species richness
- Ant abundance
  - Count of individuals
  - Distribution across plots (number of traps)
- Sample size insufficient for ordination (e.g. Bray-Curtis dissimilarity index).
- Species accumulation curves

Results

Figure 1: Abundance based on number of individuals collected per plot

Figure 2: Abundance based on number of traps per plot containing each species group

Fig 3: Species accumulation curve for combined collection (SPPE & SPPW)

Unit	Number of species found at each unit
SPPE (unburned)	11
SPPW (burned)	10

Fig 4: Total species richness for both sites

Species Found in SPPE & SPPW
Formica biophilica
Formica obscuripes
Formica pallidefulva
Formica pergandei
Formica vinculans
Lasius alienus (**E**-both sites)
Lasius neoniger
*Monomorium sp.**
Myrmica sp. 1 (**E**-burned only)
Myrmica sp. 2
Myrmica sp. 3 (**E**-burned only)
Myrmica sp. 4
*Ponera sp.**
*Stenamma sp.**

Fig 5: List of species and morphospp. identified in collection. Species marked with (**E**) were collected both in pitfall traps and directly from *Echinacea*. Rare species (<5 individuals total) are indicated by an asterix and were excluded from the bar graphs.

The Three Main Genera of Ants

Lasius (*Lasius alienus*) [Images from antweb.org]

Formica (*Formica obscuripes*)

Myrmica (*Myrmica brevispinosa*)

Conclusions

- The burned and unburned units had similar species counts, but the burned unit had more rare species, especially in the area without *Echinacea*.

- Two *Formica* subgenera (*F. rufa* group, *F. sanguinea* group) were found in only one burn unit. *Myrmica* was found in low densities over many traps except in burned areas with *Echinacea*.

- Of the 24 ants collected from *Echinacea,* 75% were *Lasius alienus* and 25% were *Myrmica* (2 spp.). No *Myrmica* were collected from the unburned unit. All ants collected from *Echinacea* were tending aphids.

- In both burn units, the aphid-tending species *Lasius alienus* was more abundant in areas with *Echinacea*. The abundance of *Lasius* was greatest in the burned unit with *Echinacea*, which also contained a greater density of aphid-infested *Echinacea* than the unburned unit (Muller, *pers. obs.*).

- This fall I will identify additional samples from the Staffanson prairie preserve as well as samples from five nearby prairie remnants. The broader sample will provide further insight into patterns of ant biodiversity in fragmented prairie.

Literature cited

Alonso, Leeanne E. "Ants as Indicators of Diversity." *Ants: Standard Methods for Measuring and Monitoring Biodiversity*. Washington: Smithsonian Institution, 2000. 80-88.

Delabie, Jaques. "Sampling Effort and Choice of Methods." *Ants: Standard Methods for Measuring and Monitoring Biodiversity*. Washington: Smithsonian Institution, 2000.

Hobbs, Richard, and Laura Huenneke. "Disturbance, Diversity, and Invasion: Implications for Conservation." *Conservation Biology* 6 (1992): 324-38.

Acknowledgments