Comparing herbaceous vegetation sampling methods on the Coconino National Forest, AZ

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Summary

- In the summer of 2008, research was conducted to determine a suitable sampling method to meet the needs of the USFS Region 3's fire fuel landscape-level mapping project.
- An "enhanced" quadrat frequency (EFM) frame (comprised of three basal hit pins, a 10x10cm, and a 40x40cm frequency frame, Figure 1) was compared to a point-frequency (PF) frame (consisting of five basal hit pins, and five, 5x5cm frequency quadrats, Figure 2).
- The EFM frame detected greater forb frequency, and species richness, but took considerable more time to sample, possibly due to the layout, and more frame lays required to get sufficient hits.

Objectives

- To choose a suitable point-sampling method for use in fire fuel landscape-level mapping projects in the forests of Region 3 (New Mexico and Arizona).
- Variables that were important to the project included: time sampled, species richness, frequency of herbaceous vegetation and cover of grasses, bare ground/rock and litter.

Collaborators

Figure 1. Enhanced Quadrat Frequency Frame (EFM), adopted from an existing quadrat frame, by the addition of 3 basal hit pins at the top and sides of the frame. The 10x10cm quadrat is in the upper left of the 40x40cm quadrat.

Figure 2. Point-Frequency Frame (PF) developed and used by Texas A&M University. It is comprised of five, 5x5cm quadrats equally spaced with a basal hit pin in the center of each quadrat.

Site Description-Methods

- The research was conducted in the summer of 2008, on the Coconino National Forest, in central Arizona by a crew consisting of researchers from Texas A&M and The University of Arizona.
- Data were gathered along 15 paired transects consisting of 100 lays of the EFM frame (300 total possible basal hits), versus 50 lays of the PF frame (250 total possible basal hits).
- Comparisons were made between: time sampled, species richness, frequency of perennial/annual forbs, annual grasses, succulents, and cover of perennial grasses, bare ground, rock and litter.
- The 10x10cm and 40x40cm EFM quadrats were recorded separately for frequency analysis

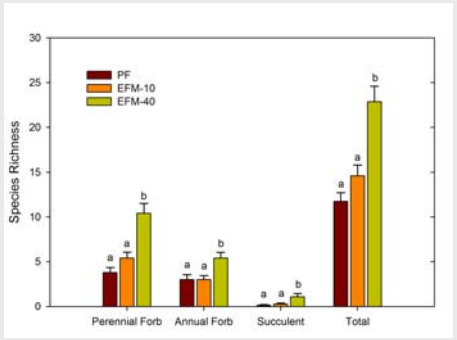

Figure 3. Species richness comparisons for Perennial Forb, Annual Forb Succulent and Total Richness. Data are means ± one standard error. Lower case letters represent significant differences (p <0.05) between methods.

Results

- No differences were detected in cover measurements (pin hits) of perennial grass, rock, litter, or bare ground ($p > 0.05$).
- Perennial/annual forb and succulent frequency were greater in the 40x40cm EFM frame ($p < 0.001$), but no differences were detected between the 10x10cm or PF frame.
- Total species richness was significantly higher in the 40x40cm (mean 22.87 ±1.73) quadrat than either the 10x10cm (14.60 ±1.21) quadrat, or the PF (11.73 ±0.98) frame ($p < 0.001$, Figure 3).
- The PF method averaged 37.89 minutes faster than the EFM method ($p < 0.001$ Figure 4).

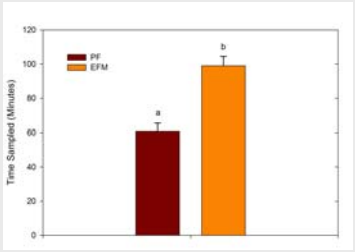

Figure 4. Sampling time comparison for EFM and PF methods. Data are means ± one standard error. Lower case letters represent significant differences (p <0.05) between methods.

Conclusions

- Both methods were suitable at estimating ground cover data.
- The point-frequency method was much faster than the Enhanced Quadrat Frequency method, but failed to encounter as many total species. This difference is mostly made up of species composing <1% of the community, and may not be necessary for modeling purposes.
- More lays of the PF frame may possibly close the gap, while maintaining a faster sampling time.

References

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