

Evaluating differences in soil biological properties under two land uses in Saskatchewan

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Soil Health

“The capacity of a soil to function within ecosystem and land-use boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.” Doran and Parkin, 1994.

Soil Biological Properties




Soil biological properties are less represented in soil health assessments than chemical and physical properties



Soil biological properties include microbial biomass and microbial activity



Soil organisms drive processes such as nutrient cycling and organic matter formation.

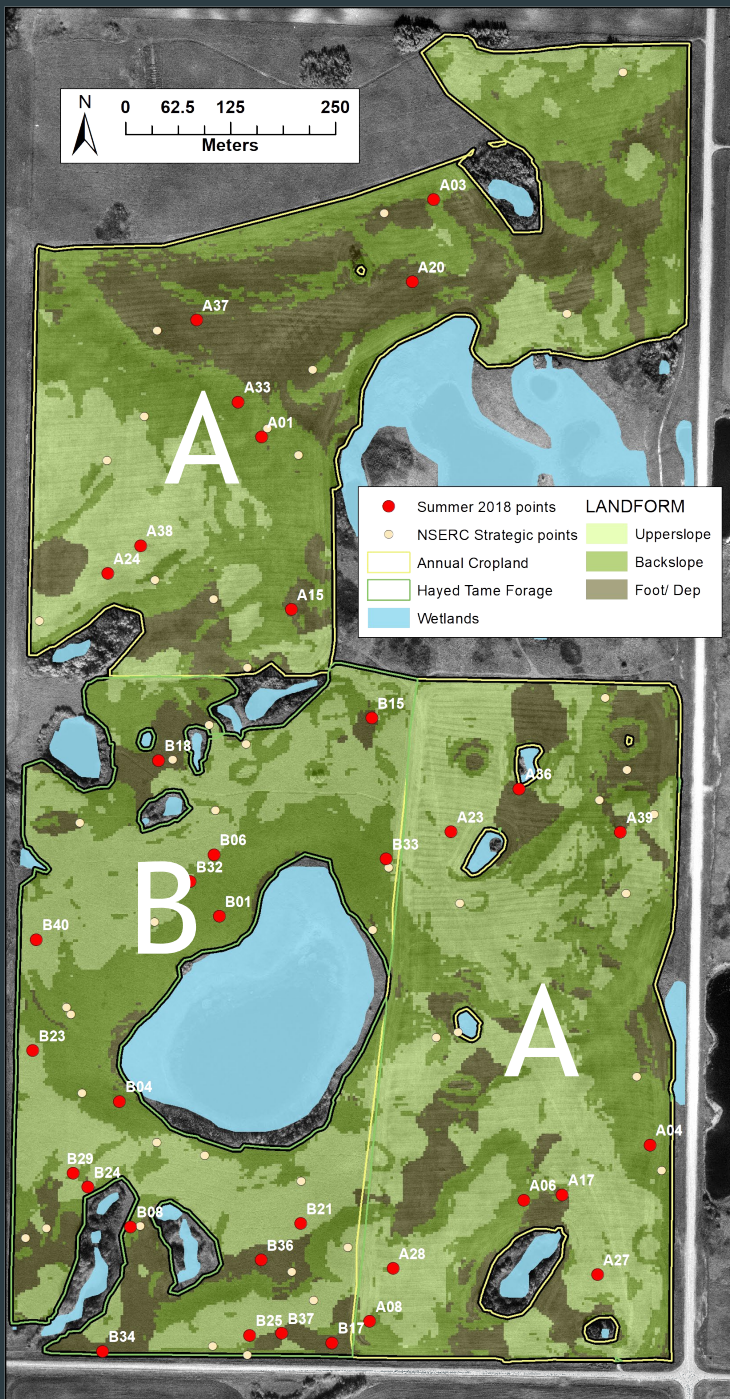


Saskatchewan's Agricultural Landscapes

Objective

To examine the role of microbial community abundance and biomass, and microbial activity, to understand how they are affected by factors such as land use, landscape position, and depth.





Site

St. Denis National Wildlife Area (SDNWA)

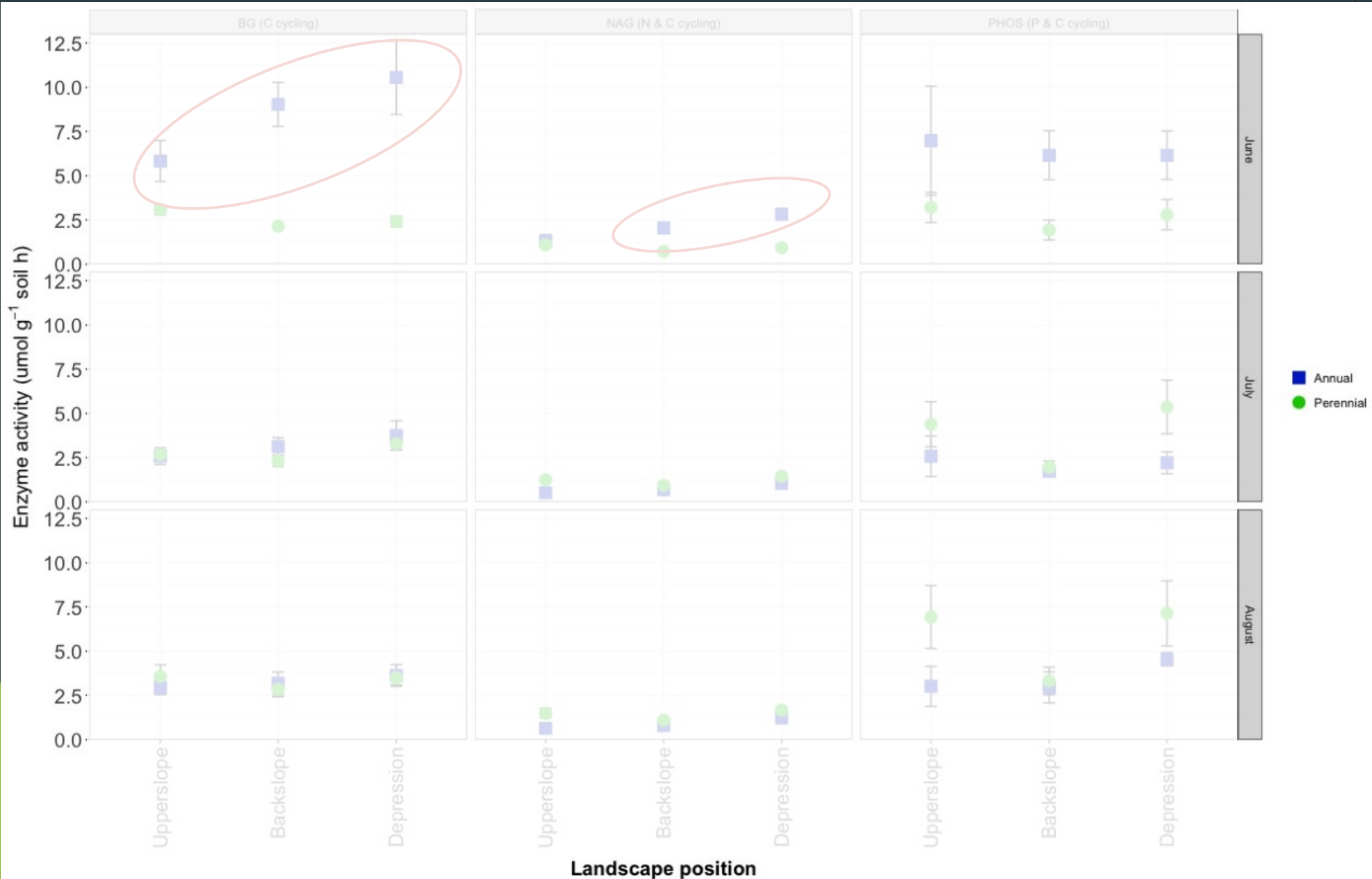
- ▶ Adjacent land uses, annual barley crop (A) and perennial hayland (B)
- ▶ 3 landscape position: Depressions, Backslopes, Upperslopes
- ▶ 3 Sampling dates: June, July, Aug
- ▶ 3 Depths (July): 0-15, 15-30, 30-45 cm
- ▶ Stratified random sampling design used from a NSERC Strategic Project - Dr. Angela Bedard-Haughn

Materials and Methods

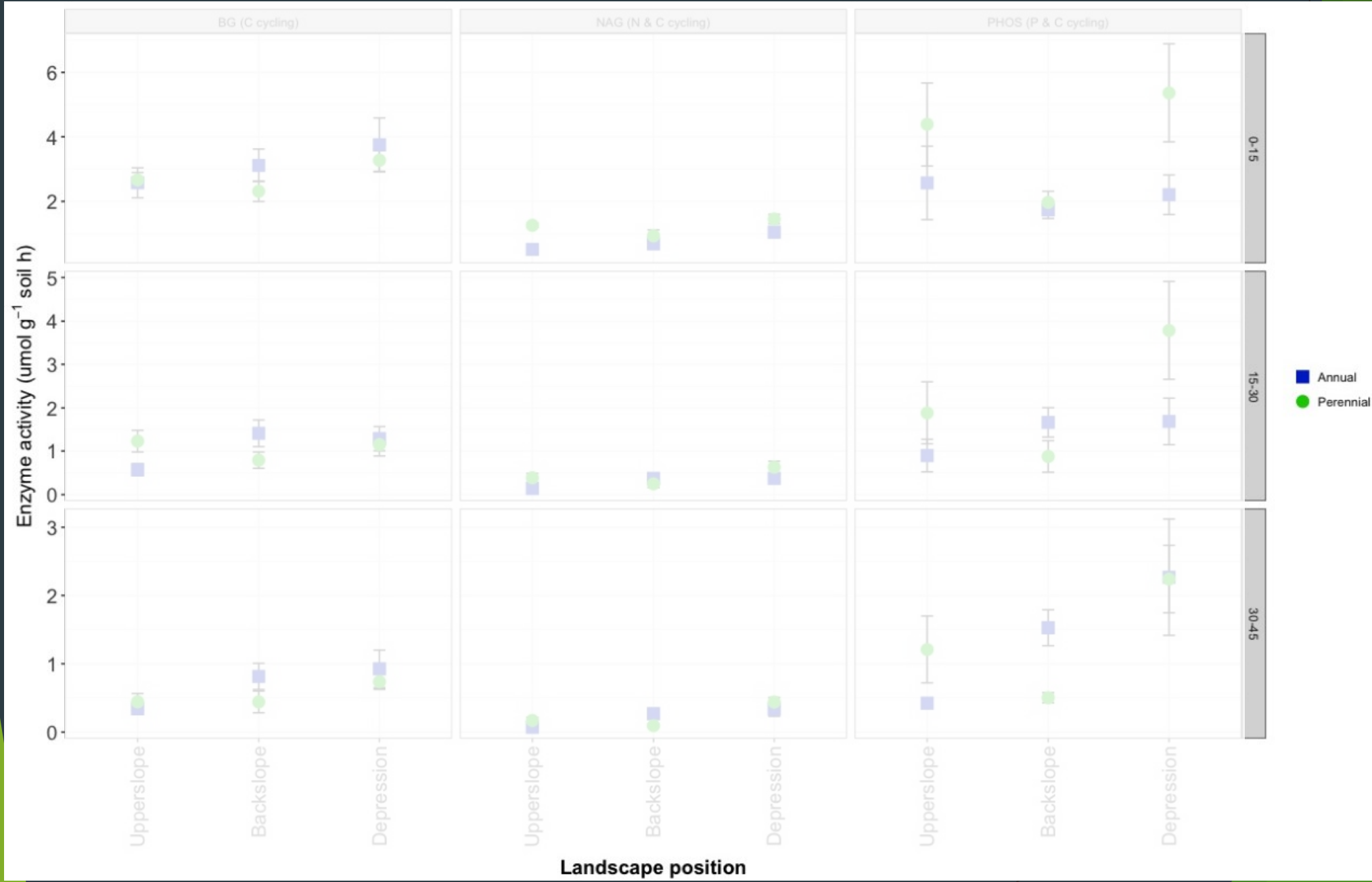
- ▶ Enzyme assays important for nutrient cycling:
 - ▶ C cycling - B-glucosidase (BG)
 - ▶ N cycling- N- acetyl glucosaminidase (NAG)
 - ▶ P cycling - Phosphatase (PHOS)
- ▶ Phospholipid fatty acids (PLFA) analysis used to measure abundance and viable microbial biomass



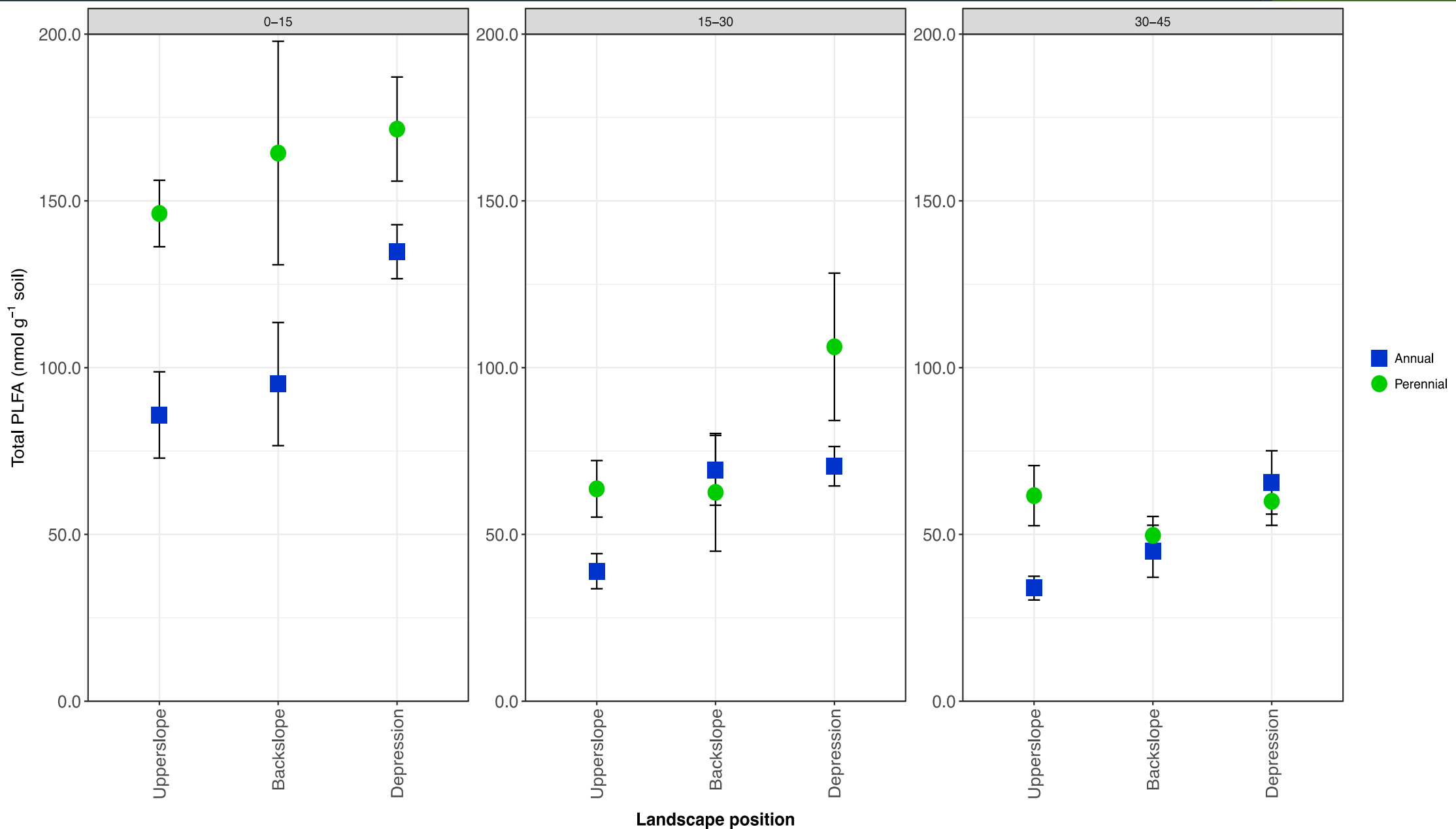
Results - Enzyme Activity within Growing Season



Results - Effect of depth on enzyme activity



Results - Microbial Biomass





Conclusion

- ▶ Enzyme activity and microbial biomass followed many patterns that we expected to see.
- ▶ Depth, land use, landscape position and season all played a role in how activity and biomass present themselves across the landscape.

Application

- ▶ As part of the NSERC strategic project microbial activity and biomass hold potential as indicators of soil health by measuring soil biological response to land use change, disturbance, and changes in soil resource distribution



Acknowledgments

A person wearing a dark long-sleeved shirt and pants is bent over in a field, using a tool to take a soil sample. The background is a field of dry grass or straw.

- ▶ Dr. Melissa Arcand (Supervisor)
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Questions?

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