# Evaluating Post-Fire Changes in Soil Microbial Communities Involved in Nitrogen Cycling in the Arctic Tundra

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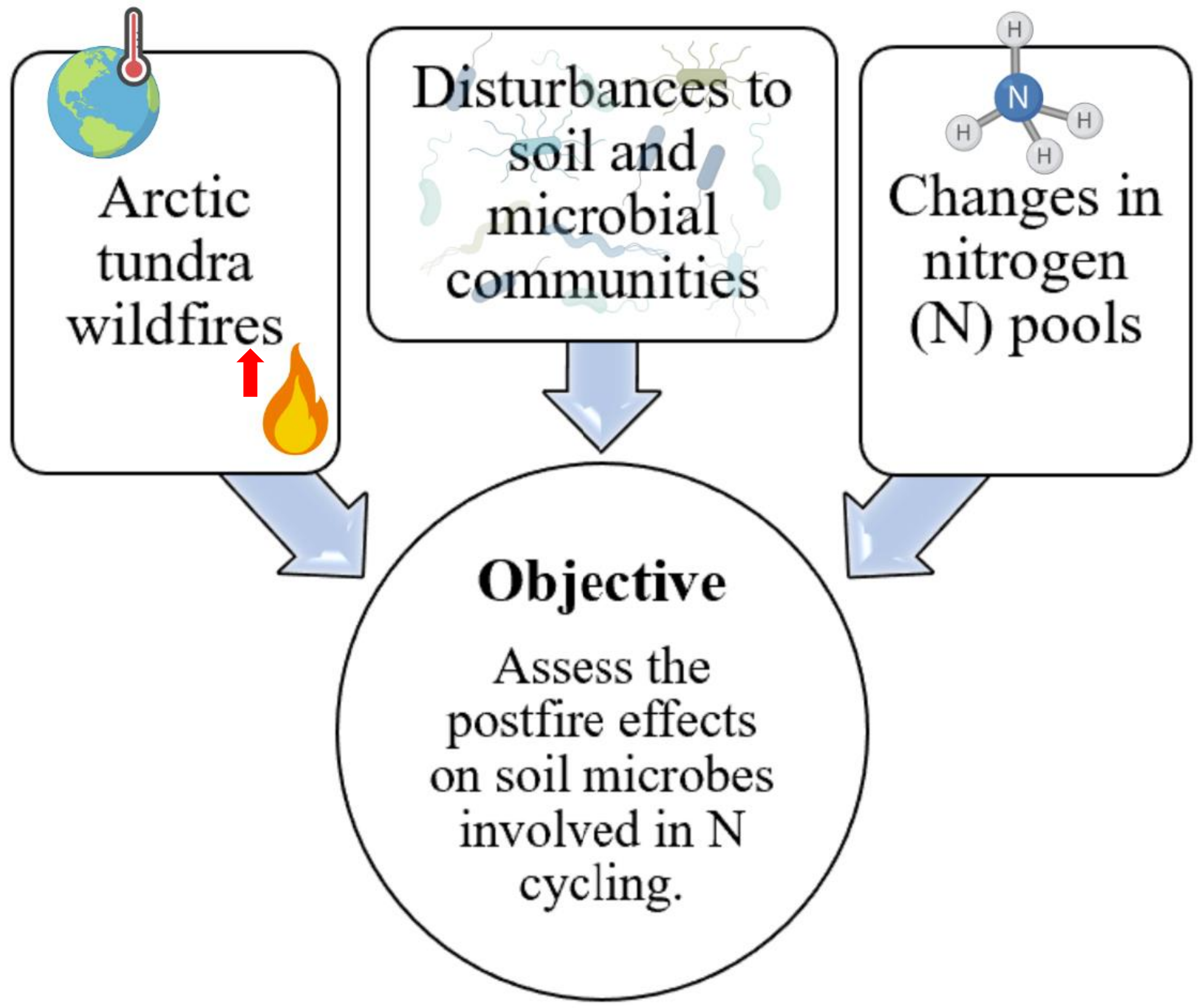
B52I-0951

## INTRODUCTION




## STUDY AREA

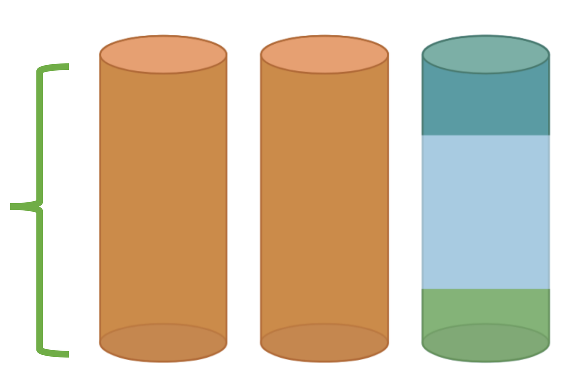
**Yukon-Kuskokwim (YK) Delta**

- Peat plateau tundra.
- More than 20 wildfires since 1953[1].

**Sampling**

- 1972 (old burn): 3 sites.
- 2015 (recent burn): 5 sites.
- Unburned control: 5 sites.

Active layer (Top 25 cm)



Soil horizons
- Fibric
- Humic
- Mineral

## METHODS

- Oxidation-reduction potential (ORP) was measured in the field.
- Soils were homogenized and frozen at -30 °C.
- Soils were dried and ground to measure total N and carbon (C) content using a combustion analyzer.

## RESULTS

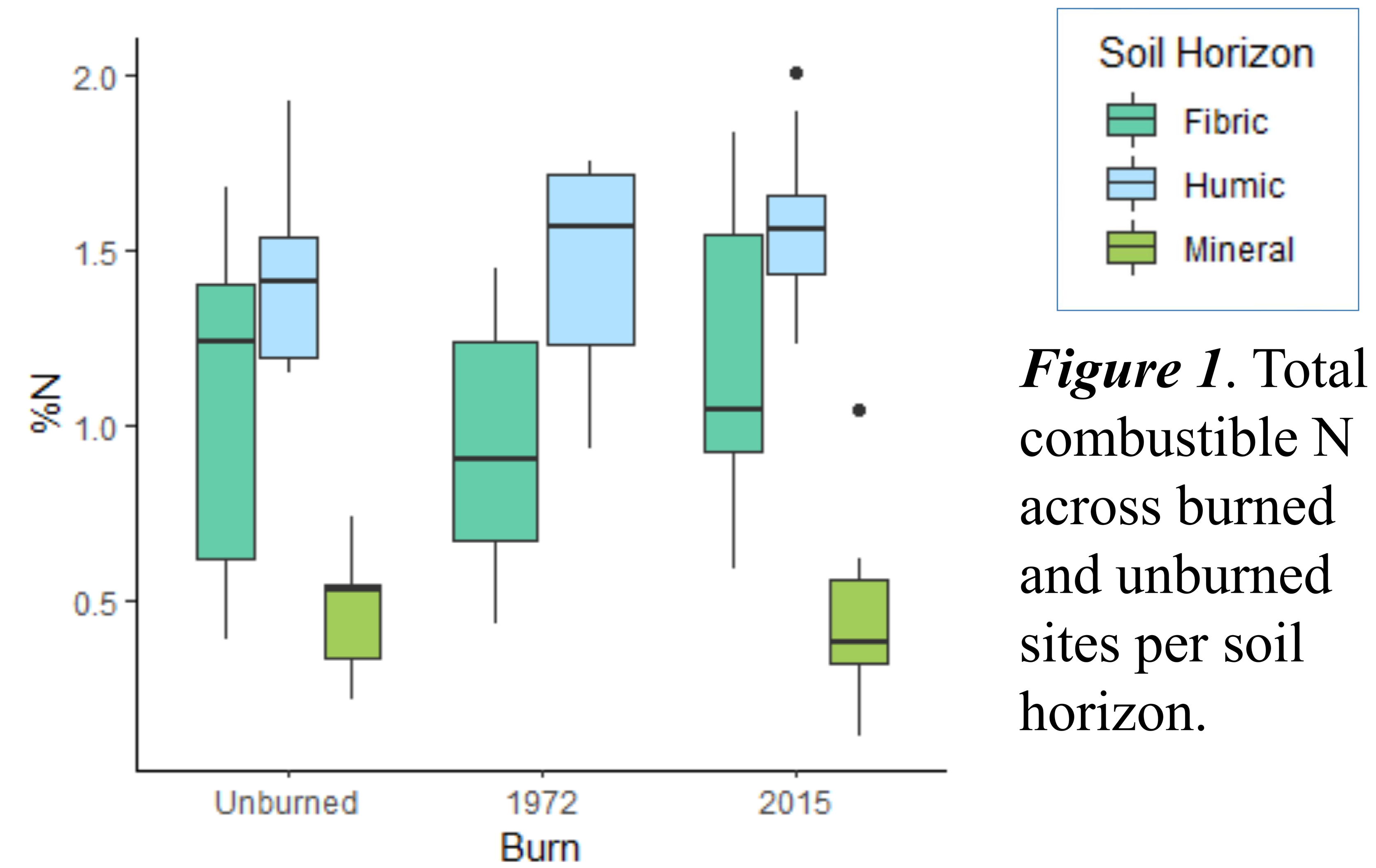



***Figure 1***. Total combustible N across burned and unburned sites per soil horizon.

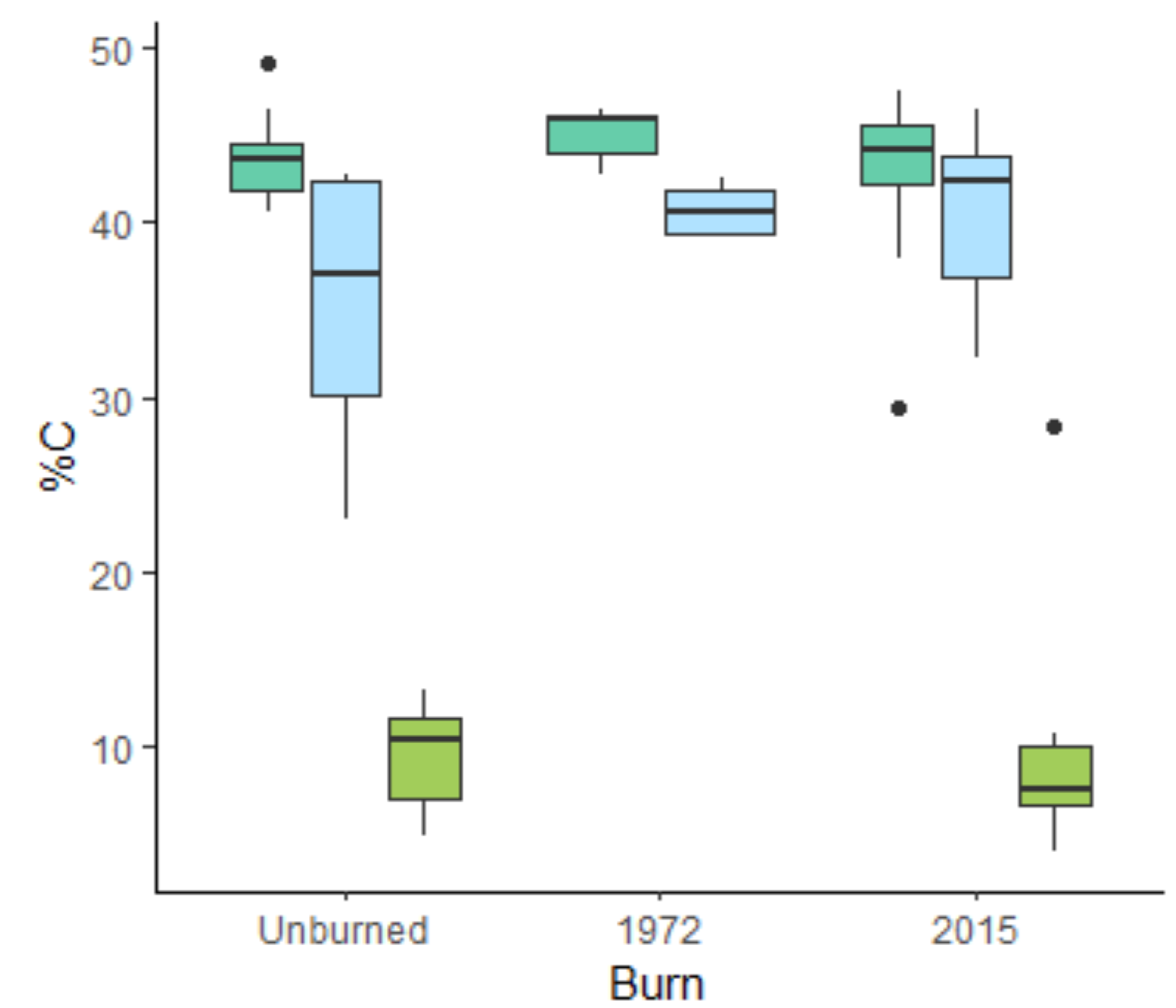



***Figure 2***. Total combustible C across burned and unburned sites per soil horizon.

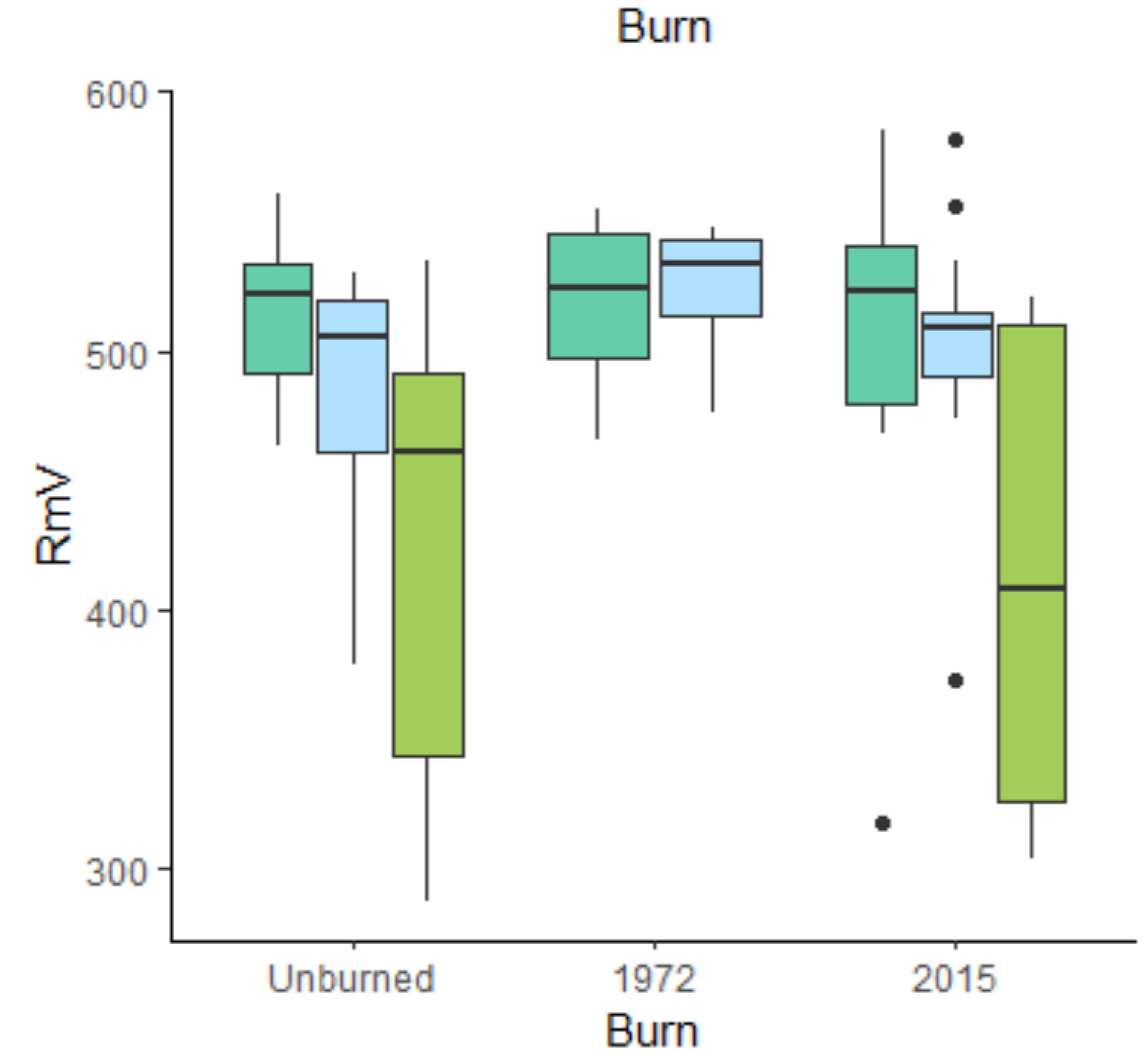



***Figure 3***. ORP across burned and unburned sites per soil horizon.

## CONCLUSION/FUTURE WORK

- Non-significant changes in total %C, %N nor ORP across burns ($p > 0.05$). This could be due to potential recovery, but more variables should be investigated.

**Next steps**:

- Calculate inorganic N pools and free amino acids.
- Explore possible microbial post-fire adaptations:
  - ➢ Are there changes in gene expression, community composition or diversity?
  - ➢ Methods: 16S Amplicon sequencing, and metatranscriptomics analyses (target N cycle genes).

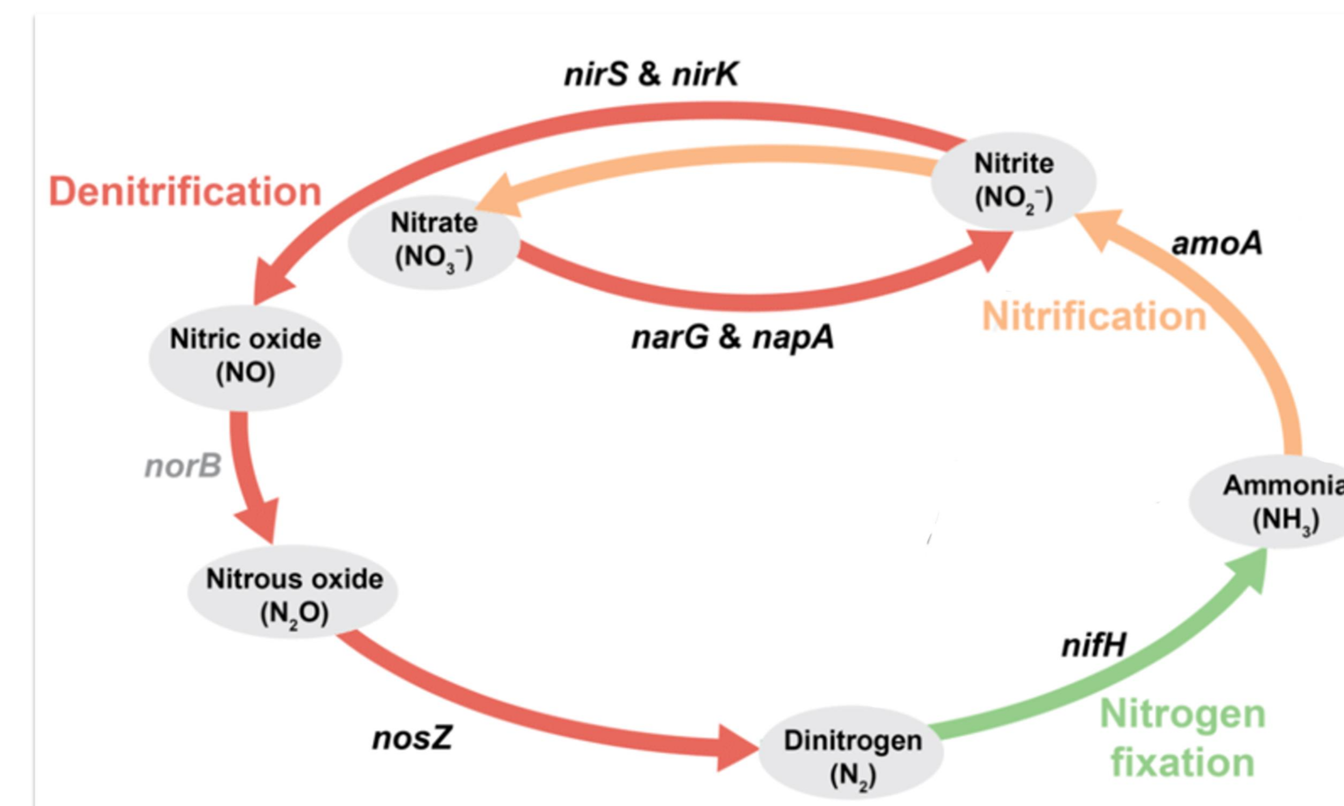



***Figure 4***. Nitrogen cycle and the respective genes involved in each pathway (from Griffith, 2016[2]).

## ACKNOWLEDGEMENTS

NSF GRFP (award 147960).
NSF fund 1915307.
Thanks to the Ernakovich lab at UNH.
We acknowledge that this research takes place on Yup'ik land.

Woodwell Polaris Project

Center of Soil Biogeochemistry and Microbial Ecology Soil BioME

### References

[1] Frost, G. V., et al. (2020). Multi-decadal patterns of vegetation succession after tundra fire on the Yukon-Kuskokwim Delta, Alaska. *Environmental Research Letters, 15(2),* 025003. https://doi.org/10.1088/1748-9326/ab5f49

[2] Griffith, J. (2016). *Insights into the soil microbial communities in New Zealand's indigenous tussock grasslands.*