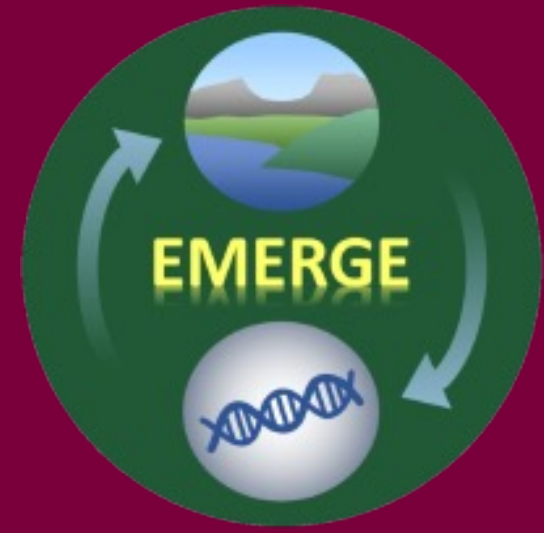


# The Wetting of Arctic Peatlands: A Microbial Perspective on Evolving Arctic Landscapes



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## Introduction

- Climate change is warming the arctic four times faster than the global average [1]
- Permafrost contains around 1,700 Pg of carbon in the top 3 meters [2].
- Warmer temperatures are increasing permafrost thaw and changing landcover in permafrost peatlands.
- Vegetation and microbial communities are closely tied in permafrost ecosystems.
- Increased potential for methane production in bogs and fens.

## Research Question

**Are there significant differences within landcover classes between microbial communities in newly transitioned sites and non-transitioned sites?**

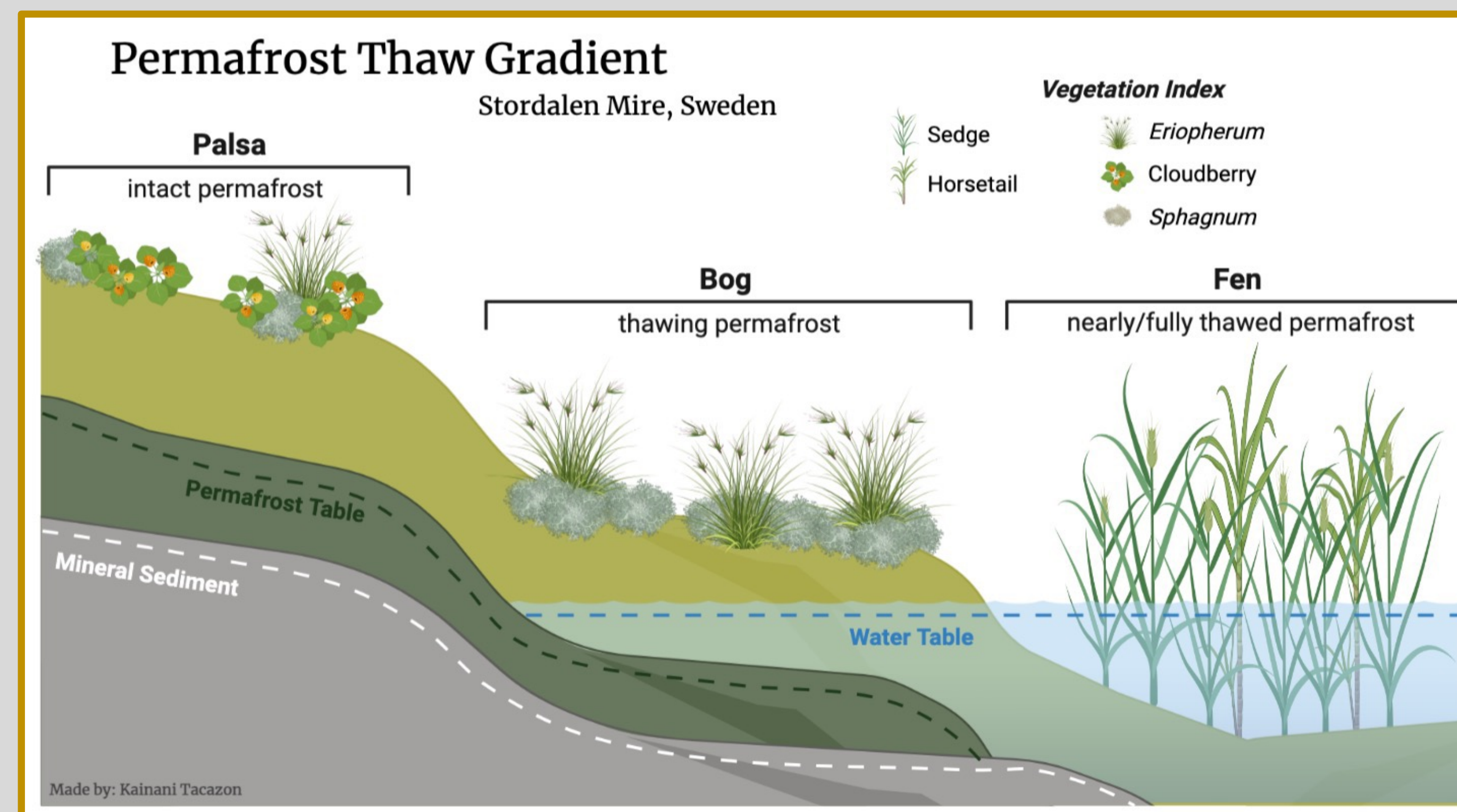


Fig 3. Representation of the Permafrost Thaw Gradient in Stordalen Mire by: Kainani Tacazon

## Methods

- We repeated a survey on 69 sites in Stordalen Mire, Sweden, using landcover classifications based on vegetation, water table depth, and active layer depth.
- We collected peat samples from each site at three depths (0-5 cm, 10-14 cm, and 20-24 cm).
- All samples were frozen following collection prior to DNA extraction.
- We extracted DNA from all peat samples within 2 weeks of collection using Qiagen Powersoil Pro kits.

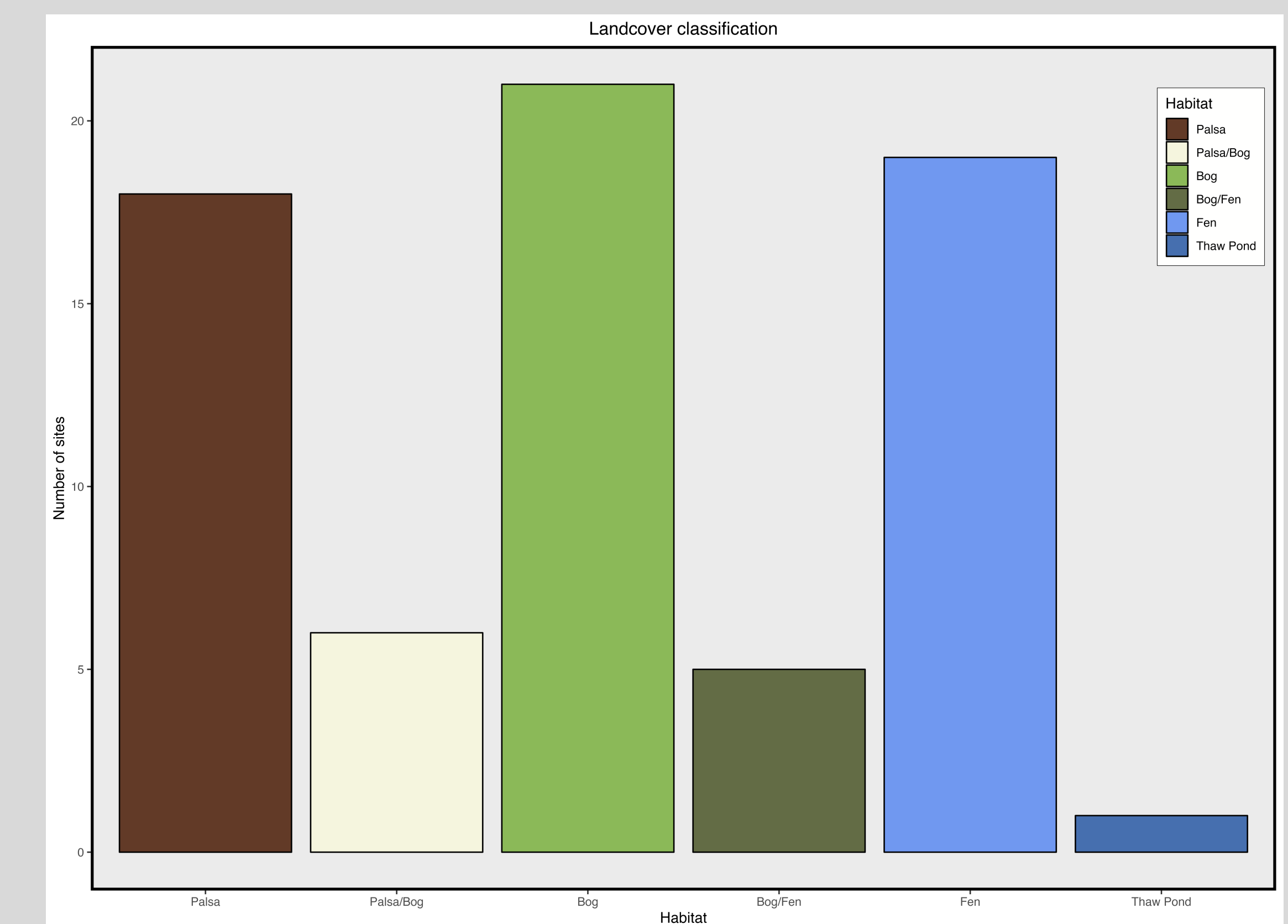


Fig 5. Landcover types found during the 2023 Mire Wide Survey.

## Implications

- Permafrost thaw exposes huge amounts of organic carbon to microbial decomposition, which can be released from the soil as CO<sub>2</sub> or methane.
- Understanding how permafrost thaw and resulting landcover change affects microbial communities in transition will inform estimates of permafrost climate feedback in the Arctic.

## Next Steps...

- Final prep and sequencing of the microbial data (~200 samples).
- Wait for sequencing results of ~200 samples.
- Analyze and interpret the data.

## Acknowledgments

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### References:

- [1] Rantanen, M., Karpechko, A. Y., Lipponen, A. et al. (2022) *Communications Earth & Environment*, 3(1).  
 [2] Holmes, M. E., Crill, P. M., Burnett, W. C., et al. (2022) *Global Biogeochemical Cycles*, 36(1),

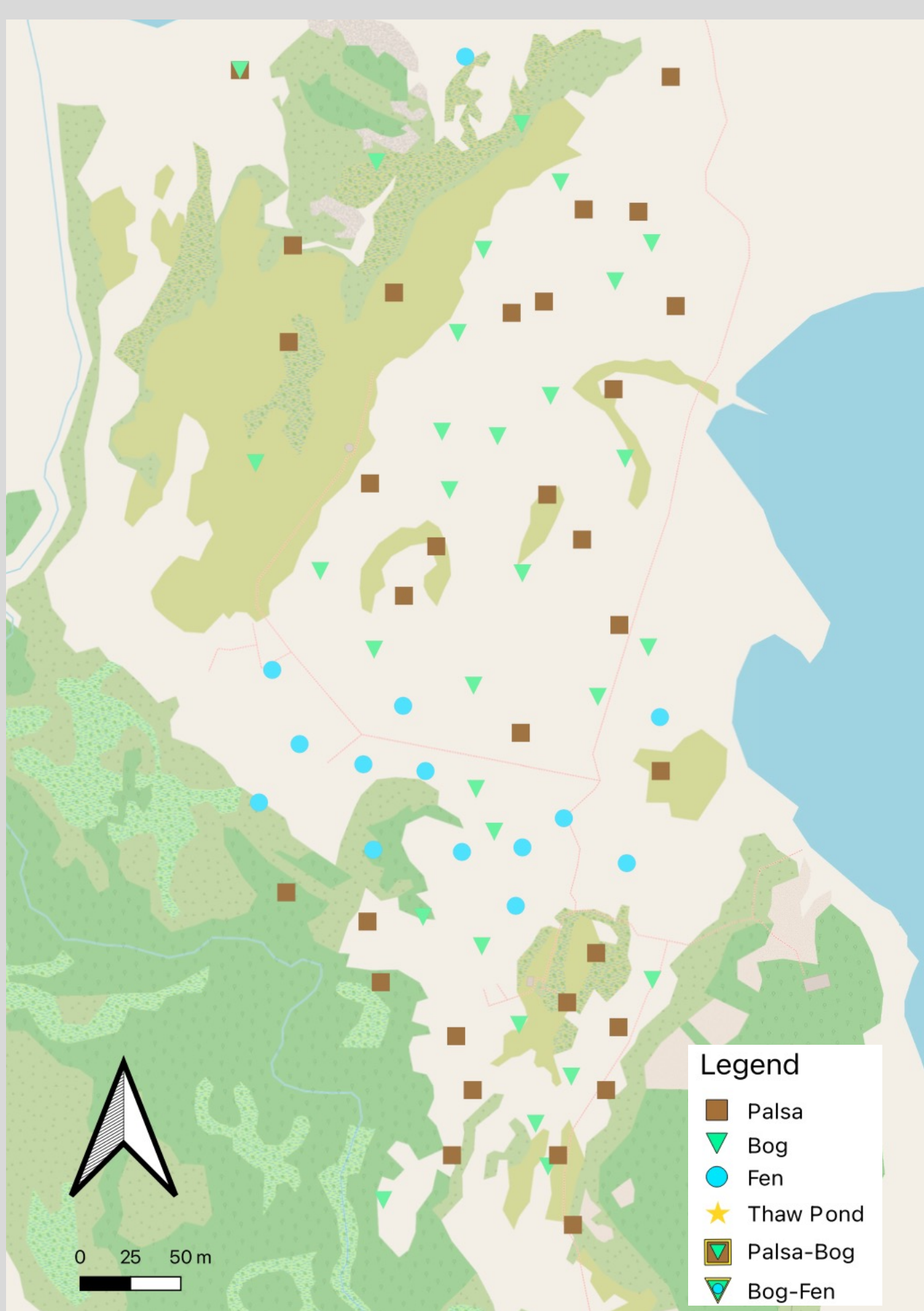


Fig 1. Stordalen Mire sampling locations for the mirewide survey in July 2015. Sites were classified as Palsa, Bog and Fen

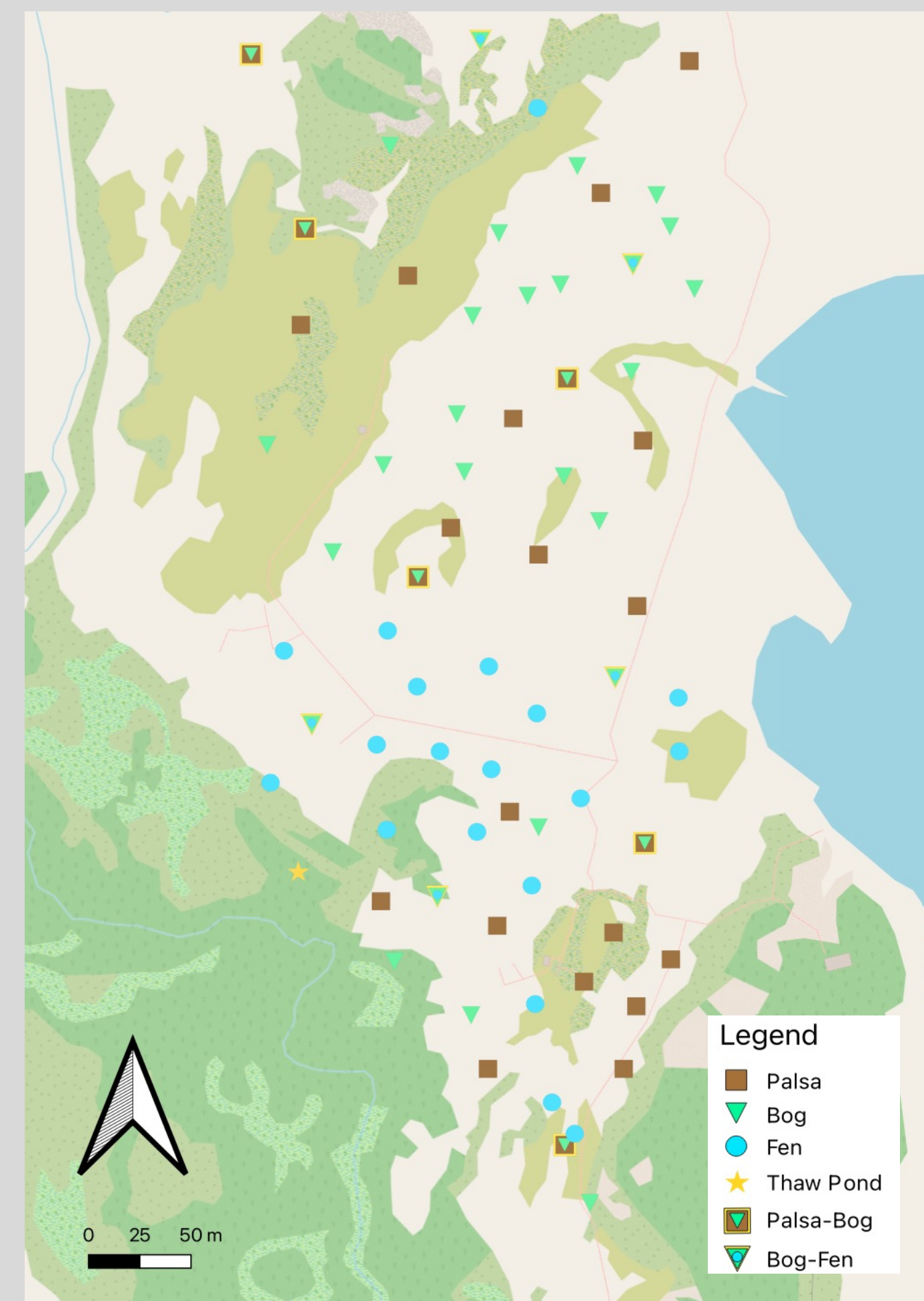


Fig 2. 2023 Mire-Wide Survey Land Cover Map. 10 sites transitioned from Palsa to bogs, and 5 sites transitioned from bog to fen. Also, a Palsa completely transitioned from a Palsa to a thaw pond.

## Hypothesis

- Recently established bogs and fens have unique microbial assemblages when they are compared with more mature counterparts, due to the brief duration in which selective pressures have been shaping these ecosystems.

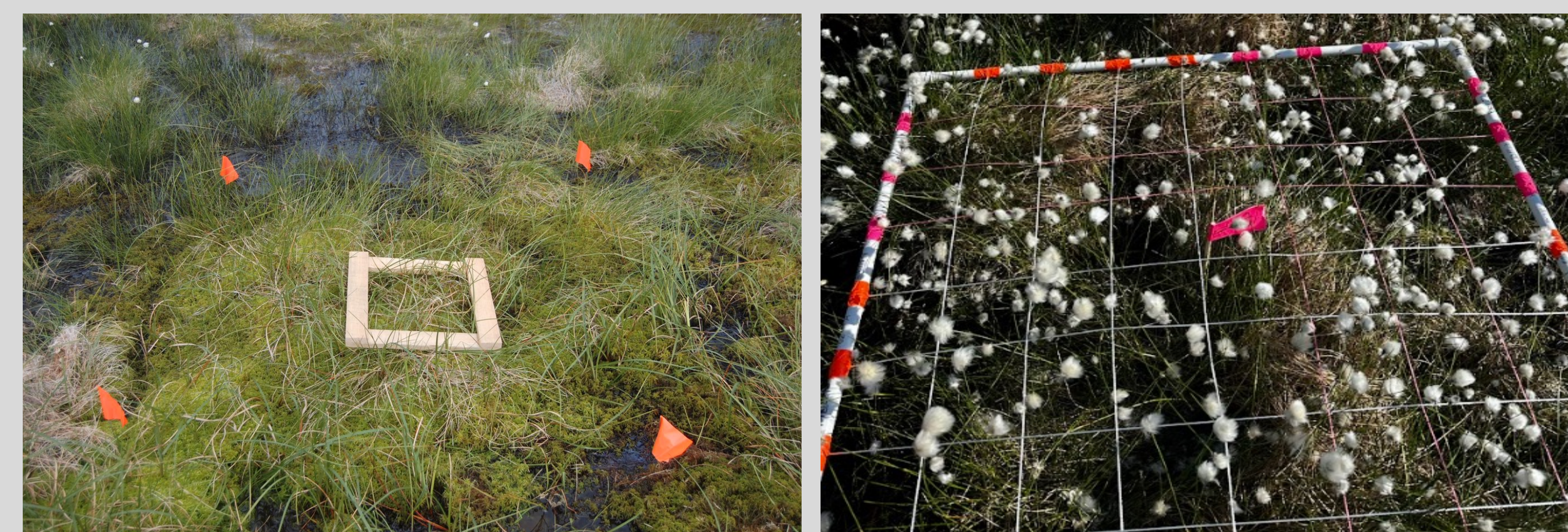


Fig 4. Example of site transitioning from Bog to Fen. Left image shows site 42 in 2015 classified as a Bog while right hand image shows site 42 in 2023 classified as a Fen.